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INTRODUCTION.

1. Crossing the Mahi on 18th September 1906, I entered Dungarpur State and reached Sagwara on 19th. The Forest Inspector arrived on 20th and on 21st; the inspection of forests was commenced, beginning with Gurapla. Leaving Sagwara, I proceeded through Galia-Kot, Chikhli Kuva, Pieth Dhambora, Genji, Mewara Gamri, Beechawara, Ratanpur, Chundanwara, etc., to Dungarpur where I reached on 7th October. Mahia, Ambara, Bahadar, Jalap, Chundanwara and Mal Mata forests were visited.

Leaving Dungarpur on 10th and inspecting Antri, Sagwara and Richhan forests, I crossed the Dungarpur State for Partabgarh forests on 20th October 1906.

2. Areas selected for reservation are, with three exceptions, the same that were previously notified to be reserved, but four of these, Jalap Ambara, Bahadar and Richhan, were given up probably for want of sufficient establishment.

Areas
selected for
Reservation.

The three blocks now proposed in Mahia is a strip of land about ten miles long and two to three miles broad along the Mahi river. Under protection this will become a very valuable forest owing to its being close to the river and easy for export purposes. The other two are Sagwara and Gurapla. These also are not very far from the Mahi, and contain a good deal of Teak, and with protection will become very valuable.

The proposed boundaries and the description about the state of growing stock is given in Appendix I.

3. At present Teak, Sador, Haldu, Temru, Dhaura, Khair Gharar, Sarin, Shisham (*Dalbergia latifolia*), Pihu (*Dalbergia sissoo*), and Babul are of commercial value, but there are also other kinds of good size which will be saleable if put into the market; these are Ambia, Bin, Rohin, Khejra, Kalam, Sewan, Jaman and Nim, etc.

Trees that
have
Commercial
value.

The list of more common trees found in the State is given in Appendix II.

Teak, Temru, Sador, Dhaura, Shisham and Khair, even when of small sizes, are saleable, though their value will considerably be enhanced if they are allowed to grow into large-sized trees, but there are others which, when of small size, are of little value; these are Ghorur, Sarin Mohua, Nim, Babul, Khejra, Rohin, Khanjera, Haldu, Sewan, etc. Thus trees of the latter kind should be allowed to grow into at least six feet in girth before being felled, unless they are dying or unsound. Sound growing trees of the former kind should also not be felled before they are six feet in girth.

Fire Conser-
vancy.

4. Fire should, as far as possible, be kept out of the forests as it is the chief enemy of the forest growth of all kinds. Measures undertaken to protect the forests from fires are :—

- (a) Clearing of fire lines along the outer boundary of the forests to prevent the fires lighted outside the forests from entering into them.
- (b) Clearing a net-work of intermediate fire lines so as to divide the forest into small areas to prevent the fire lighted in any one of the sub-divisions crossing into others.
- (c) To maintain a staff of fire watchers during the fire season, *i.e.*, after the grass has dried up to the beginning of the monsoon rains.

5. The width of fire lines depends on the height and density of grass, prevalence or otherwise of heavy winds during the season. The width may be anything between 40 to 100 feet, and sometimes even more. A width of 60 feet would be sufficient in the forests of this State.

6. The cost of protecting forests from fire in the Central Provinces is about 2 ans. 6 pias per acre per annum, or Rs. 100 per square mile. The cost under the present financial state of forests is prohibitive, but the boundary fire lines may be kept clear, and also a certain width along the existing path or the compartment lines. Besides this, villages situated inside the reserves may have a line all round them cleared by the villagers if possible. This cordon should be burnt in the presence of the Forest Staff.

7. The people living inside or along the forests may also be given to understand that the lighting of fires will not be allowed to go unpunished. The villagers who conceal the offenders or do not help in finding out the culprits may have their rights, over the area burnt, suspended for a period not exceeding five years at the discretion of the Durbar.

8. Small rewards may also be given to the villages in case of the forest, in which they have rights, escaping from fire.

9. Fire lines should only be burnt at night time, because any sparks that may be carried away by the wind are easily noticeable. The heat during the day time is also against the carrying out of this operation.

Rights and
their Regula-
tion and
Restriction.

10. The people used, till of late, to cut anything they liked and in any way they liked, but since the last two or three years efforts have been made, and with some success, to protect certain kinds of trees; while the rest may still be cut at the sweet will of the people. The above restrictions are in two reserved forests, while no restrictions are imposed in others. I think that the *bond fide* needs of the villages, situated in the reserves or whose lands adjoin them, may be met, but only with the permission of the Forest Officer. The huts are made in a most wasteful manner, and the efforts of the Forest Staff to induce the Bhils to build mud walls will considerably reduce the demand on forest produce.

11. The rights may roughly be divided into two kinds :—

(1) Those for which no previous permission should be necessary are :—

- (a) Grazing for the cattle being the *bonâ fide* property of the holder.
- (b) Grass-cutting.
- (c) Dead and fallen wood for burning purposes.
- (d) Dead and fallen wood for sale on head-loads by the Bhils only.
- (e) Collection of wild fruits, flowers, honey, etc.

(2) Those rights for which previous permission of the Forest Officer may be considered necessary :—

- (a) Timber and bamboos for house building and for agricultural implements.
- (b) Green trees to be felled for firewood purposes, only in case of there being no dry fallen wood available in the forest at a convenient distance.

If these suggestions be accepted and carried out, the waste of material at present going on will be avoided, and consequently the corresponding increase in the material available for export and net surplus will be great during the first period of fellings.

12. The grass although plentiful cannot, under the present condition, be utilized, as the carriage from Dungarpur to Talod, the nearest railway station, is annas 12 per maund Imperial, and unless the hay can be sold there at Re. 1 per maund no profit can be got at.

Utilization
of Grass and
other minor
Produce.

Other minor produce are gums of Dhawra, Khankra Acacias, Karaili and Albizzias. Then there are roots such as Dhauri and Siyahmuslis; leases for the collection of which may be sold.

13. Large areas are covered with Khankra and Zyzzyphus, the species suited for lac culture. There is a large demand for this product, and the rearing of lac may be taken in hand. In this way the areas which are at present of little value may produce a large and profitable industry.

PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

1. The Dungarpur State is situated in the extreme south of Rajputana, and is bounded on the north-west by Mewar, in the east and south-east by Banswara, and south and south-west by the Rewa and Mahikantha States of the Bombay Presidency.

1. Name and situation

2. The country is mostly hilly with a few scattered level areas of small extent. The hills surround the State on all sides, and ranges of low hills also run through the centre of the State. The north and the eastern portion is comparatively poor in forest vegetation.

2. Configuration of the ground.

3. The drainage of the country is carried out, viz.:—

- (a) The northern portion is drained by the river Som—and its branches—which has its rise in the Mewar State, for the greater portion form the northern boundary of the State.
- (b) The drainage of the central portion is carried out by the Moran Nala which joins the Mahi a little above Galia-Kot.
- (c) The southern and south-western portion is drained by Bahadar and Majam rivers with their tributaries.

These all flow into the Mahi river which forms the eastern and southern boundary of the State for over fifty-five miles. The Som and Moran join the Mahi within the Dungarpur territories, while Bahadar and Majam and its branches join it in the Bombay Presidency.

4. All these rivers depend on the monsoon rains for water, and run for various lengths of time according to the mildness or severity of the monsoon, and are quite dry during the greater part of the year.

5. The underlying rock in the State is mostly sandstone; at places granite and other shales are also noticeable. The soil for the most part is sandy loam, except when shale comes in, when the proportion of clay is comparatively larger. In such places Sadar appears in comparatively larger proportions, and of fairly big sizes. The soil is very variable in its composition, from almost pure coarse sand to fine clay are noticed, but on the whole it is nowhere unsuited to tree growth. In places rock crops up at the surface, and in such, no vegetation can, of course, be expected, but these are not numerous or very large in area.

3. Underlying Rock and Soil.

6. The climate is the usual climate of southern Rajputana.

Climate.

The lowest temperature is in January and the highest in the month of May. The daily average temperature of the year is maximum 91°, minimum 72°. The average annual rainfall is twenty-five inches, but it varies considerably, it being only ten inches during the famine year.

7. The agricultural customs and wants of the people are simple, and the wants of the population are limited chiefly to timber of small sizes. Timber over eighteen inches in girth is very rarely used, and then too, in small quantities, and a length of over twenty feet is rarely demanded.

5. Agricultural customs and wants of the people.

8. Owing to the large supply which is still available, and to the absence of any restriction, till of late, more forest produce is at present consumed than is absolutely necessary for the well-being of the people. As there is no data about the timber and firewood used per head of population, I quote the quantities used in the Central Provinces where the people inhabiting the area round forests are of similar stock, and have the same customs.

					Quantity used per head of population per annum.
					Maunds.
Wood and bamboos for building and for agricultural implements	...	...	...	...	4
Firewood...	...	...	...	...	5
Total					9

The grass is so plentiful and of no value, that I do not consider it worth while to say much about its consumption.

9. The trees at present in use by the people are Teak (*tictona grandis*), used as rafter wood beams and up-rights in houses. The leaves are for thatching, and for harvesting small grain such as Kuri, etc.

Sador (*Terminalia tomentosa*) for rafter and beams, Temru (*diospyros melanoxydon*) for beams, poles for carts, rafters and ploughs, etc.

Khair (*acacia catechu*) for house posts and agricultural implements. Babul (*acacia arabica*) for carts and Persian wheels and other agricultural implements.

Khejra (*acacia leucophloea*) for agricultural implements and Persian wheels.

Haldu (<i>A. Cordifolia</i>)	} For beams for house building.
Rohin (<i>S. Febrifuga</i>)	
Ghorar (<i>A. Provera</i>)	
Sarin (<i>A. Lebeck</i>)	

and the last also for bangles ; Dhaura for plough and agricultural implements.

Mokha (*schrebera sweetenoides*) for beams, bark eaten in times of scarcity; Mahua (*bassia latifolia*) for beams ; Kakria (*lagerstœmia parviflora*) for rafters and agricultural implements; Shisham (*dalbergia latifolia*) for furniture and beds, etc.

Bans (*dcndrocalanus strictus*) for roofing walls of Bhil huts, mats, baskets, fancing, etc.

10. Generally speaking the demand on the forests for the requirements of the people is :—

Wood and bamboos for building, agricultural implements, furniture, carts, mats and baskets and for fuel.

Grass for thatching, ropes, fodder and grazing.

Tanning, chiefly the leaves of Dhaura bark of Sador, Khejra and Babul.

Manufacture of spirits and articles of food	} Flowers of Mahua.
Manufacture of oil ...	
...	Seeds „ „

Besides the above, fibres are produced from the bark of the roots of Khankra, and the leaves used for thatching and other purposes; gums as medicines, etc., roots are eaten or exported.

Composition and Condition of the Forests.

11. The forest is distributed all over the State, it being richer in the central and south-western portions, while in the north it is rather poor. The area of the forests reserved and proposed to be reserved is about 600 square miles, which includes about 100 square miles of cultivation, the remaining purely forest area being 500 square miles, which is a little more than one-third of the total area of the State, 1,447, square miles, of which square miles is under cultivation. The country is pre-eminently a forest country. Almost all the suitable land for cultivation in the forests is taken up, and hence no extensions on a large scale are possible. The Bhil community, the most numerous one in the State, is dependent on forests, and hence for their welfare the forests should be maintained, as well as for the more valuable reason of maintaining the water supply and attracting rains.

1. Distribution and Area.

12. The boundaries of the two forests, Antri and Chandrawara Mal-matha reserved forests, have been demarcated by large stones painted with coal tar, but these boundary marks are neither substantial nor close enough to be seen from each other, therefore, it is necessary that pillars be erected at distances at which they can be seen from each other. Also a line about sixty feet wide should be cleared and kept up permanently which may also serve the purpose of fire lines.

2. State of Boundaries.

Similar boundary marks may also be erected for the newly proposed reserves, and the consecutive numbers cut on the pillars.

For the present, numbers are allotted to the pillars in the register of boundaries, but corresponding numbers are not cut on the pillars, and should now be done.

13. All land in the State not given up for cultivation is owned by the State, and hence it is the sole master of the forests.

3. Legal position.

14. Hitherto there has been no check whatever on the forests or their produce, but for the past three years certain protection has been given to the forests reserved. Cutting of Teak has been prohibited, and of other species only for agricultural implements such as ploughs, etc., has been permitted to be cut without permission. The cutting of bamboos has been prohibited without payment in the reserves. In the Antri forest even timber for building has been prohibited. This shows the people have no real rights, but privileges enjoyed for centuries should, I think, be respected, and it may be said that villages situated inside the reserves or adjoining the reserves have right to :—

4. Rights.

(a) Timber and bamboos for house building and agricultural implements, except in Antri forest where they have only for agricultural implements.

(b) Firewood.

(c) Grass, grazing and other minor produce for their *bonâ fide* personal wants and not for sale or barter.

15. The crop is as usual a mixed one of the low hill type; speaking broadly there are three types represented in the areas to be reserved :—

- (i) The low grounds are either pure Khankra (*butia frondosa*) where the drainage is not quite free, but as soon as this passes into the soil with free drainage, Teak and its companions also come in, or where the soil is light and comparatively poor, Khair, Khejra and Zyzyphus take the place of Khankra.
- (ii) On old abandoned village sites, Khejra, Babul and Zyzyphus are met with.
- (iii) The usual mixed forest of Teak and its companions such as Temrú, Dhaura, Khankra, Khair, Sador, Rohin, Haldu, Umbia, Pihu (*dalbergia sessoo*) Nim, Shisham, Mokha, etc. Jaman, Ghorar and Arjan, etc., being found only along the banks of the streams. Salar is not so common in the forests of the State as in Banswara and Partabgarh so as to form a separate type, but it is met with here and there. There are large grassy blanks in the forests, but some of these are being covered with natural seedlings in the small protection afforded in the three years. Where fires have not entered, poles of twenty to thirty feet high are met with in sheltered localities along the streams. The leaf canopy is very various and of all shades. In some places dense thickets, eight to ten feet high, of Dhaura and Rohu, have come up. This speaks favourably about the protection afforded during the past three years.

16. The forests not having been under systematic working, all the valuable species have been hacked in a most reckless manner, and almost all are on bad and mutilated basis.

No trees of any size of the valuable species are met with except a small patch of mature trees along the Mewara Nala, which contains fairly large trees of Ghorar, Temru, Sador and Bahera.

From this it appears that if left standing in suitable localities these trees would grow into fine tall trees capable of yielding timber of good dimensions.

17. The trees cut were badly mutilated in a manner that no stumps were found fit for counting annual rings. I counted annual rings on four Teak poles thirty-six inches in girth cut for Dhambora Police Station, and found that they contained on the average nine rings per inch of radius of fifty-four years old.

The Teak is the most valuable of species, but in this State it is near its northern limit and cannot be expected to grow into anything like the dimensions it attains in its proper home; even near temples no trees of any size have been found.

18. No data are available as to the production per acre of the produce of various descriptions.

Only a part of the produce is timber of certain species, and is at present not saleable owing to the great distance from the centres of consumption and the absence of good roads. These grow in the forests in various proportions; at places only scattered specimens of saleable kinds being met with, at others they form the majority of the crop. At present owing to the condition of the forests and mutilated nature of the existing

stock, it will not be advisable to remove more than a ton of small timber per acre, but with protection this will increase to three or four tons or even more.

19. Annual fires are the greatest danger to which the crop is at present liable, which kill or cut back the young trees, but by injury to the bark and wood of the older ones, render them more liable to the attacks of insects and fungus, and their wood is not so useful as without such injury.

6. Injuries to which the crop is liable.

20. In exceptionally dry years the crop is liable to suffer from drought. In the famine year 1899, a large number of Teak and other trees dried from this cause, of which a good many are still standing in the forests.

System of Management.

21. The Forest Department has been created in the State since the last three years or so. Before this there was no management, but a little time before the establishment of the Forest Department, a royalty or customs duty was begun to be levied on all forest produce exported from the State.

1. Past and Present System of Management.

22. When the Forest Department was organised, the Forest Inspector got sanction to levy a small royalty on timber. Now every cart of timber exported has to pay Ans. 12 royalty to the Forest Department and Rs. 2-3 customs duty to the Customs Department. I do not see the use of this double system of duties. The timber brought from the State forests ought to pay royalty, but the State, I think, ought not to charge customs on the produce it sells itself; therefore, I think that only one duty should be levied, say Rs. 3 per cart load, and the revenue credited to the Forest Department. It matters little whether it will be collected by the Forest or Customs Department.

23. At present no green timber is allowed to be cut and exported; only dead Teak and Sadar trees are allowed to be cut.

24. None carried out.

2. Special works of Improvement undertaken

25. The revenue derived from the State forests, and the expenditure incurred on them, have in the past been very small. In 1905-06, the total receipts from forest produce of all kinds, collected through the Customs and Forest Departments, were Rs. 2,100.

3. Past Revenue and Expenditure.

Utilization of the Produce.

26. The marketable products are:—

- (a) Timber of various species, such as Teak, Sadar, Temru, Albizzias, Lebbeck and Procera, Haldu (*adina cordifolia*), Dalbergia, Sissoo and latifolia, Bassia latifolia, Acacia, Catechu Arabica and Leucophloea, Melia Indica and Rohin, etc., are available, though at present only in small quantities and of small sizes.

4. Marketable products: quantities consumed in past years.

- (b) Firewood in large quantities.
- (c) Bamboos.
- (d) Minor products such as gums of sorts, roots, fruits, flowers and honey, etc.

27. There is no data as to quantities consumed during past years.

2. Lines of Export.

28. Up to this the produce has been exported by head-loads to the adjoining States of Rewa and Mahi Kantha by the Bhils, and by carts from Mewara and Ratanpur to Morasa and Ahmedabad in the Guzerat.

The places of consumption are far off, and the carriage of small timber by carts is necessarily costly, hence only small quantities have been carried by carts. The roads are bad and, therefore, carriage is difficult.

29. The forest area in the State is intersected by many streams, and the chief river, the Mahi, is not far from five of the proposed reserves. The streams can, in ordinary years, be utilized for floating timber. The timber may be cut and collected along the banks of the streams, and as soon as they begin to flow it may be launched and taken down where the Mahi crosses the Railway line. It will certainly pay to take down timber in the Mahi and other streams, but it is not certain whether it would pay to float firewood or not. The experiment may, however, be tried, and if it succeeds then the large quantity of firewood that is at present being wasted will be utilized, and the question of improving the forests within a reasonable time be rendered easier.

3. Markets.

30. Guzerat is the only market; but the quantities of timber and firewood in Ahmedabad and other large towns are very large, and if the State can put in these markets the product of its forests there ought to be no lack of buyers.

4. Mode of extraction and its cost.

31. As the extraction has been done solely by private persons, and not departmentally, there has been no charge on extraction.

5. Net value of each class of produce.

32. As no departmental operations have been undertaken, this cannot be ascertained, but the rates of royalty charged for different kinds of products are :—

TABLE.

Miscellaneous Facts.

33. The Forest Staff entertained at present annually, is :—

	Rs.
1 Forest Inspector @ Rs. 25 per month ...	300
3 Havildars @ Rs. 8 per month each ...	288
1 Moharrir „ „ 10 „ „ ...	120
25 Forest Guards @ Rs. 4 per month each ...	1,200
Total	<u>1,908</u>

1. The
Forest Staff.

34. As no works have ever been undertaken it cannot be said for certain whether labourers, in sufficient numbers, will be available for the various forest works or not. The Bhil community have from remote times existed upon forests, and they are the only labourers available at present. They do not seem to like the idea of felling and converting large trees, even when growing close to their huts, as it involves much labour; dead trees of valuable species have been noticed standing close to their villages unutilized, while only small branches are cut and taken away. At places it has been noticed that to get rid of them they are set on fire. Efforts should be made to train them to the use of saw and, as far as obtainable, large trees should be granted to the right-holders for their personal use.

2. Labour
supply.

PART II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

1. Basis of
Proposals.

35. The proposals are based on the assumption that the forests require protection and improvement in the first place; and that not more than one ton of small timber per acre absolutely from dead, dying, malformed and stunted trees be extracted; that the firewood-yielding trees should not at present be exploited, except so far as they be interfering with the growth of more valuable species.

36. That leaving the reproduction of areas covered by tree growth more or less to mature, grassy blanks to the extent of 300 acres per annum be sown or planted with Teak, and nurseries be established to fill up the blanks caused by failure in the areas sown.

37. That special fire conservancy measures be adopted in a few selected forests, owing to the cost being prohibitive in the present financial state of the forests.

38. That lac culture may be taken in hand owing to the presence of trees suitable for rearing of lac over large areas.

2. Working
circles, how
composed;
reasons for
their forma-
tion.

39. It is proposed to form each of the proposed nine reserves into a separate working circle so that the requirements of the villagers may be met with at reasonably convenient places from their homes.

That the labourers may not have to go far away from their homes, which they do not like.

Each reserve may be divided into fifteen compartments, and each compartment be taken up consecutively each year.

The object required in each of these working circles is the same, i.e., improvement of the growing stock and utilization of any malformed trees cut to the best advantage.

40. With the exception of the Antri forest, which primarily is to be maintained for the protection of game, only dead and dying trees will be removed.

The remaining eight working circles will yield a variety of material from dead, dying and malformed or stunted trees to be cut back.

41. The working circles thus will be :—

- (1) Antri.
- (2) Chundanwara Malmatha.
- (3) Bahadar.
- (4) Ambara.
- (5) Jalap.
- (6) Mahiya.
- (7) Sagwara.
- (8) Gurapla.
- (9) Richhan.

42. All undemarcated forests, which should include all waste land not assessed to land revenue, should be formed into a separate working circle.

43. The whole forest area requires one treatment, i.e., protection and improvement, but as the requirements of the local population have to be considered, and the concentration of the work will moreover imply the collection of large numbers of labourers away from their homes, it is therefore necessary that the working be made to suit all conditions. Hence the proposal that each forest may be constituted into a separate working circle.

44. It is proposed to divide each of the nine forests into fifteen compartments more or less of equal sizes. The boundaries of these compartments may be fixed to prominent ridges or ravines or paths or straight lines cut across the forest, which may serve as fire lines as well as lines of export. No attempt is made to make compartments according to the growing stock, nor is this necessary, as the growing stock is so variable that compartments, if attempted to be made, will be of very irregular shape and various sizes.

3. Compartments and justification of the subdivision.

45. As it is proposed to take out the present mutilated and deformed stock in thirty years each portion is to be gone over twice after an interval of fifteen years. It is better to have the compartments corresponding to the coupes of yearly fellings.

46. The crops consist of much mutilated growing stock, and with inferior species less mutilated; crop valuation is useless at present owing to remoteness of the centres of consumption.

4. Analysis of crop; method of valuation employed.

47. As it is simply proposed to improve the growing stock area check with the removal of only those trees that can strictly, with due regard to sylvicultural conditions, be removed, it is considered sufficient.

Detailed valuations under this simple treatment are not considered necessary.

Method of Treatment.

48. The object sought to be attained is to maintain these lands as forests, to act with beneficial influence in attracting rains and maintain the water supply, which, in a locality depending solely on rains for its water supply, is no small factor; and to yield as much revenue to their owner as may consistently, with due regard to the above and the wants of the local population, can be obtained, provided their condition as forests is maintained but improved as well.

1. Object sought to be attained.

49. The object sought after is the same in all the working circles. The trees required to be removed should be marked and then cut and exported. If purchasers can be found for the standing stock, the department will be saved the trouble of cutting and exporting it to the markets, but in the beginning at least, the work will have to be done departmentally so that the people may know that it pays, and private individuals will come in to buy the standing stock.

2. Method
of Treatment
adopted.

50. If the whole produce were saleable the simplest method to adopt would be coppice with standards, but as it is not, and only a portion of the produce is saleable, it is best to adopt the improvement-felling method. This method differs from the coppice one only in the intensity of its operations. The coppice with twenty to twenty-five standards would be left standing per acre, and the whole remainder cut out, while in the improvement-felling method only those trees that are malformed and stunted will be taken out, or some trees of the inferior species which are actually interfering with the promising specimens of the more valuable species.

3. Exploitable age.

51. No data are available to fix the exploitable age of the crop; there are next to no mature trees of the species that are at present saleable. The forests having been open to all who had the inclination to cut and take away anything he liked; the trees have been treated in a most barbarous manner. If a piece of wood two feet in length of certain dimensions was wanted, no attempt was made to cut a tree but to climb up and cut exactly what it suited the person, and thus destroy the whole fine tree and so on.

52. As the local requirements are chiefly of small poles and sapplings, the valuable kinds of trees such as Teak, Sador, Dhaura, Temru, Shisham, etc., are not allowed to grow beyond those dimensions.

53. It is not necessary in the present proposals to fix the exploitable age, as the main thing sought after in the present proposal is to put the forests on the way to improvement. Only dead, dying, unsound, and malformed trees of valuable kinds, and the individuals of less valuable kinds that are actually interfering with the growth of their more valuable companions will be removed.

54. After fifteen years for which period these proposals are framed, the condition of the forests will have considerably improved, and data about the rate of growth collected by the Forest Staff will be available. Then it will be time to decide about the exploitable age of the crop.

The Fillings.

1 The
General
Working
Scheme:
calculation
of the possibility.

55. The working scheme will be similar in all the working circles with this exception that in Antri only dead and dying trees will be removed. Of the 500 square miles about one-fourth is grassy blanks, and about seventy square miles comprises Khankra and other species not at present saleable. The remainder, about 300 square miles, comprise such species that are saleable. It is proposed not to take out more than one ton per acre of small timber in the first fifteen years, except Antri, where half-a ton per acre will be extracted and, therefore, the total yield will be:—

			Tons.
100 square miles = 64,000 acres @			
$\frac{1}{2}$ a ton per acre =	...	...	32,000
200 square miles = 128,000 acres @			
1 ton per acre	...	...	128,000
Total	...	...	<u>160,000</u>

56. Out of this the department has to meet the requirements of the right-holders, *i.e.*, villagers living inside or adjoining the forests proposed to be reserved. Assuming that one-third of the population of the State has a right to the produce of these forests, or say in round numbers 35,000 souls, and taking the Central Provinces' figures for the quantity required per head of population per annum, *i.e.*, four maunds, the total for the right-holders is :—

$$\frac{35,000 \times 4 \times 15}{27} = 77,770$$

or say 78,000 tons during the whole period of the first fifteen years, leaving a surplus of (160,000—78,000)=82,000 tons for export or sale. The wants of the remaining population will be met from the undemarcated forests, or if any be taken from these forests it will have to be paid for at the usual rates.

57. Besides the above there will be a large quantity of firewood available for sale, but as the demand for this kind of produce does not exist, it is, therefore, necessary to calculate the possibility of this produce.

If possible, the portion of trees felled in Improvement-fellings which cannot be utilized as timber, and dead and fallen trees of trees yielding only firewood, should be disposed of as firewood or turned into charcoal.

58. The bamboos in this State are suffering very much from over-cuttings; no shoots, except those for the current year, were noticed. It is proposed that at least for one year to come, no bamboos should be allowed to be cut, and then worked on a rotation of five years. The area cut one year should have a four years' rest before it is again opened for cutting. In this way not only the stock will be improved but bamboos better suited for different purposes be obtained. It is estimated that after meeting the local requirements 30,000 bamboos per annum will be available for sale.

59. The fellings are prescribed for a period of fifteen years, towards the close of which the scheme may be revised.

2. Period for which fellings are prescribed.

60. The area to be felled annually is approximately one-fifteenth of each of the nine working circles. As the forests have not all been demarcated nor compartments marked off on the ground, the order of their allotment cannot be given, but it is proposed to work consecutively all the compartments marked, Compartment No. 1 during the 1st and 15th on the last year of the period.

3. Areas to be felled annually or periodically, in the order of their allotment.

61. It is proposed to work the forests on the Improvement-felling method. The trees to be felled will be marked by the Forest Officer who, while marking trees, will observe the following rules:—

4. Nature and mode of executing the fellings.

- (1) No sound growing tree of any of the timber-yielding species will be marked for felling on any account.
- (2) All dying, malformed or unsound trees of timber-yielding species will be marked for fellings provided :—
 - (a) No isolated tree, however malformed or unsound, be marked.
 - (b) No tree standing on a precipice or very steep ground be marked.

- (c) No trees standing on the border of a large blank be marked.
- (d) The removal of the tree marked should not cause a large opening after the trees are felled.
- (3) The trees of species not yielding timber be only marked for felling or girdling when they be actually interfering with the growth of promising individuals of more valuable species, or are likely to interfere within a short time.

62. The trees should all be cut flush with the ground and the stools properly dressed. The central portion of the stools should be slightly raised to allow the water not to collect on the stools. In the case of small stools and those growing on a sloping ground the stools may be cut slanting. In case of trees over six feet in girth which are not likely to produce coppice shoots, the stools need not be cut too close to the ground or dressed properly.

63. Cutting and transport will have to be done departmentally in the beginning, at any rate, till private individuals come in to buy the standing stock. Whatever agency be employed, the department should see that stools are not cut too high, and are properly dressed.

64. In the undemarcated working circle the only restrictions to be imposed are :—

- (I) The following kinds of trees may not be cut without permission in writing of the village headman or such other person whom the Kamdar may appoint if the headman be not considered competent, or has abused the authority vested in him :—

- (1) Teak (*Tectona grandis*).
- (2) Sador (*Terminalia tomentosa*).
- (3) Mohura (*Bassia latifolia*).
- (4) Temru (*Diospyros melanoxylon*).
- (5) Nim (*Meila indica*).
- (6) Ghorar (*Albizia procera*).
- (7) Sarin (*Albizia lebbbeck*).
- (8) Babul (*Acaria arabica*).
- (9) Khejra (*Acacia leucophlœa*).
- (10) Haldu (*Adina cordifolia*).
- (11) Rohim (*Soymidia febrifuga*).
- (12) Khair (*Acacia catechu*).
- (13) Jaman (*Euginia jambulana*).

- (II) All other kinds of trees may be cut for their *bonâ fide* personal requirements, but not for sale or for barter. They may also lop the trees except the thirteen kinds mentioned, provided no tree less than 7 hâth in girth is lopped. The Bhils may also take head-loads of dry, fallen wood for sale. The practice of cutting down young Khojra and other trees merely to feed a wretched goat or two should be stopped.

65. The trees of the thirteen kinds mentioned above may be allowed to be cut for *bonâ fide* personal requirements by the village headman or other

person appointed by the Kamdar, but no trees less than a hath in girth should be permitted to be cut except when there be no tree of that girth available in the forest.

66. No trees be cut for sale or for barter in this circle except with the permission in writing of the State Kamdar,

67. After conclusion of fellings proposed during the first period, there will be improved stock of one to fifteen years, and more in age of more valuable species, consisting :—

5. Forecast of condition of crops at their conclusion.

- (a) Of coppice shoots from the stools of the trees felled in Improvement-fellings.
- (b) Of self-sown seedlings that will spring up round seed bearers of the various species.
- (c) The trees preserved in the first fellings. These with better protection will enhance the capacity of the forests considerably, and material available for removal during the second period will be at least two to three tons per acre instead of one ton proposed to be removed during the first period of fellings. Moreover, owing to the quality of the stock available being improved, the rate realizable per ton will also be higher than at present.

Supplementary Regulations.

68. The result of protection from fire and other causes will be that, along with valuable species, other undesirable kinds of vegetation such as climbers, etc., have also better chance of reproduction. Sometimes less valuable but more pushing species get an upper hand of the more valuable ones and thus call for the assistance of the Forester. Climbers and creepers more especially of larger kinds, render their victims of little value and retard their growth to such an extent that unless relieved in time even their life is in danger; these should be cut down. Once in five years will be enough for this purpose as well as for helping the more valuable species against their less valuable assailants. Bamboos will also have a better chance of spreading with the protection from fire, and may sometime suppress Teak and other valuable trees which should be relieved by the cutting down of such shoots as lie suppressing them. Again individuals of the same species may be growing too close for their development; then these should be thinned out, but I am afraid this will not be necessary during the first period except in rare cases.

1. Cleanings, thinnings, and other improvement fellings.

69. The grass in forest lands and even outside the forests is too plentiful, and at present of no value; the cattle in most cases not numerous enough to cause any apprehension in the near future, but there is no forest which may be considered free of grazing rights. This right may safely be admitted, but the number of cattle possessed by each village should be enumerated and recorded. They may at the same time be allowed an increase of fifty per cent., and in the case of Bhils who have very few cattle even cent. per cent. over the number be thus recorded. Any

2. Grazing and other rights.

excess over and above this should, if admitted in the forests, be paid for; but certainly there should be no right to graze any cattle above the number allowed for.

This is necessary because grass and grazing may become more valuable in the future by the opening up of the country by better roads, and probably by railway in the future, however remote.

70. Other rights may be summarised as under :—

- (a) Timber, usually small poles and saplings, bamboos for house-buildings, and agricultural implements.
- (b) Firewood for burning and for sale in head-loads by Bhils in the surrounding villages and towns. Minor produce such as gums, lac, flowers, and fruits honey.

The last when exported has to pay customs duties, but forest tribes such as Bhils, if they export any of these products, generally do it in small quantities on their heads; and as they generally do not go by the public path, not feeling the necessity, the customs duty more often is not paid at all. The Forest Inspector told me that during the last season most of the gums that were taken to Kherwara for sale had not paid any customs duty; therefore, if possible, a small fee be charged per man allowed to collect gum or other minor produce removed for sale.

3. Sowing, planting and other works special to each circle.

71. The areas that are under tree growth may, for the present, be left to nature for their reproduction, assisted by wounding the soil round seed bearers. With protection from fire the self sown seedlings, which under the existing condition has no chance to grow, will cover the small gaps. The large grassy blanks are found in all the forests and may be taken up first for artificial regeneration. Lines twenty feet to thirty feet apart may be prepared and sown with teak seed at a cost of Rs. 3 per acre. On an average 300 acres may thus be planted per annum during the first period of fifteen years. Nurseries may also be established in each of the forests in which planting is resorted to, so as to have sufficient number of seedlings available to fill up failures in the sowings. The nurseries should be selected in places where water be available for watering the planting when necessary.

These small nurseries should not cost more than Rs. 150 per annum.

Proportion of more valuable species such as Shisham, Ghorar, Teak, etc., may, whenever possible, be increased by mean of wounding the soil round seed bearers by broadcast, cheap sowings in favourable localities suited to the particular species, or by planting and cutting, for instance, of Ghorar along the nullah banks.

4. Improvements common to whole areas.

72. The forests should be opened out by roads, as with protection the growing stock is bound to improve, and in time even large timber will also be available, and unless the forests are opened out, produce could be extracted economically. Moreover, it will be found cheaper to lay out the roads now and keep the lines clear, when the forest is rather open, than to cut the thick forest afterwards. These lines may be kept clear and as funds are available turn it into cart tracks or roads.

These lines should, as far as possible, be made to conform with the boundaries of compartments so that they may serve more than one purpose.

- (a) Export lines.
- (b) Compart lines.
- (c) Fire lines.

Foresters and Forest Guards' huts may also be built in suitable localities.

Miscellaneous.

73. There being a large and growing demand for lac, and the species suitable for lac culture, but otherwise valueless covering large areas in the forests of the State, it is proposed that the rearing of lac on these species be taken in hand. These species are given in a descending order of their prevalence:—

1. Miscellaneous prescriptions.

(1) Khankra (*butia frondosa*).

(2) Bor and Kat bor { *Zyzyphus jujaba*.
" *nummalaria*.
" *zylopara*.

(3) Pipal (*ficus religiosa*).

The insects which grow on these three different species are different, and different kinds of seed be obtained and propagated on the respective kinds of trees on which they flourish.

74. At present the head of the Forest Department in the State is Inspector-Jamadar Samandarkhan, drawing Rs. 25 per mensem. So far as protection is concerned he is quite able to look after the forests; but the present proposal will necessitate, not only the protection, but intelligent carrying out of the proposals. The boundaries of the forests will have to be marked on the maps, and the lines for export and fire conservancy laid out on the ground and on the map. Nor does the present officer know anything about sowing.

2. Changes proposed in the Forest Staff.

For all these a trained officer will be required. His pay may be fixed at Rs. 60 to Rs. 150. There should also be three Foresters. The present Forest Officer may be one, and two others appointed on Rs. 15 each.

The present staff of three Havildars and twenty-five Forest Guards looks after two reserved forests, Antri and Chundanwara, Mal Mata forests, and for the remaining seven forests a staff of eighteen Forest Guards is proposed, three each for Jalap, Ambara and Bahadar, one for Mahia, two each Sagwara and Gurapla and four for Richhan.

Again the pay of the Forest Guards on Rs. 4 each is very low, and it is not expected to get good men on that pay. It is proposed that two Forest Guards be on Rs. 10, three on Rs. 8, five on Rs. 7, five on Rs. 6, and the remaining on Rs. 5 per mensem.

There should be four peons on Rs. 5, one Muharrir on Rs. 10 may also be added, and a clerk on Rs. 25.

Thus the total charge will be :—					Rs.
Share of Superintendent's pay and that of his staff					1,200
Pay of Forest Officer, say on the average on Rs. 90					
per mensem	...	...	...	..	1,080
Pay of Clerk @ Rs. 25 per mensem					300
Two Munshis „ 10 each					240
Three Foresters on an average on Rs. 25 each, per					
mensem	...	...	...	...	900
Two Forest Guards on Rs. 10 each per mensem					240
Three	„	„	8	„	288
Five	„	„	7	„	420
Five	„	„	6	„	360
Thirty	„	„	5	„	1,800
Total					6,828

per annum, or for the whole period of fifteen years, Rs. 1,02,420.

3. Financial
results of
proposed
workings.

75. The financial results of the proposed workings during the first period of fifteen years are :—

I. Receipts.					Rs.
82,000 tons of small timber @ Rs. 3 per ton					2,46,000
40,000 „ firewood @ ans. 8 per ton					20,000
450,000 bamboos @ ans. 5 per ton.					1,400
Grass, grazing and other minor produce					1,560
TOTAL RECEIPTS					2,83,000

II. Charges.					Rs.
Demarcation					14,000
Sowing, planting, establishment of nurseries and					
lac culture	...	...	...	...	18,000
Roads					12,000
Buildings and their up-keep					3,500
Cleaning, thinnings and other Improvement-					
fellings	...	...	...	...	15,000
Fire conservancy					28,000
Purchase of tools and plant					2,000
Pay of establishment					1,02,420
Travelling allowance					18,000
Contingencies					8,000
TOTAL CHARGES					2,20,920
Net Surplus					62,080

It may be noted that the rates at which the produce is saleable are quoted, and no allowance has been made for realization of better prices on opening of the roads. The cost on cutting and export and the corresponding increase in the value of the produce, when taken to markets by departmental agency, has been ignored, as no data are available for different kinds

of works such as felling, carting, rafting, etc. Efforts were made to send down some timber and firewood in a raft in the Mahi, but it failed owing to the Forest Inspector reporting at the last moment to the Kamdar that there was not enough water in the Mahi. Though on crossing the Mahi after twenty days of the receipt of that reply, I found that there was sufficient water; but perhaps the Forest Inspector's idea of sufficient water is different, as he has never seen a raft before being taken down the river.

76. As the proper compilation of working plans depends on the data available, it is proposed that the records and control books should be kept up, as far as possible, in accordance with forms prescribed by the Forest Department Code.

4. Collection of data and up-keep of records and control forms.

77. To obtain information regarding the rate of growth of different species, composing the crop, it is suggested that two or more sample plots of say, half-an-acre each, may be marked out in all the forests, and measurements of girth at four and a half feet from the ground be taken yearly and recorded in a book.

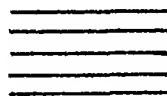
Sample plots.

To ensure the measurements being taken at the same place year after year, a broad band of white paint should be painted round every tree. The trees in the plot should be numbered, and the numbers allotted to the trees be painted on tin plates which should be nailed on to the trees.

78. The area burnt in any forest should be noted in the Fire Conservancy Register, and tracings of each forest showing the compartments kept up for the record of fires. One tracing will suffice for five years' record.

Fire conservancy registers and maps.

Areas burnt during the 1st year of the period may be marked by parallel lines thus :—



That during the 2nd in vertical parallel lines thus :—



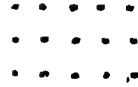
3rd year diagonal lines thus :—



4th year diagonal lines in
opposite directions thus :—

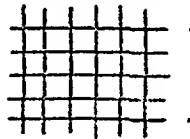


5th year dotted lines thus :—

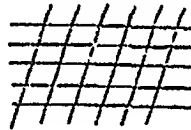


The above shows the state of any forest burnt during any one year of the period of five years.

An area burnt during the first year and also during the 2nd year will be shown thus :—

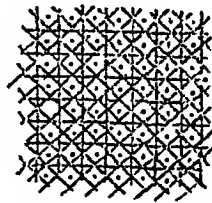


That burnt during the 1st and 3rd year thus :—



and so on.

Any area burnt five times successively in the period will show thus:—



Forest
Journal.

79. A Forest Journal showing work done in each of the working circles during the year, with its cost and the revenue if any realized, should be kept up. Any special features of the year such as dryness or otherwise, prevalence of hot winds, occurrence of frost, the number of compartments felled, the quantity of timber and other produce removed, should also be noted.

8. Control
Forms.

80. It is also proposed that Control Forms, as far as possible to conform with Forms No. 2 and 4 of the Forest Department Code, 6th Edition, be kept up.

APPENDIX I.

Description of Forests in Dungarpur State

No.	Name of Forest.	Boundaries,	Elevation, slope, soil, etc.	Description.	REMARKS.
1	Antri forest	North—Dungarpur town and village lands and Birpur village lands. East—Mando and Wardha, etc, villages South—Darbodnia, Dedson Phapta, etc., villages. West—Mewara, Versan Kangura and Pagraun, etc., villages.	Elevation—700 to 1,403 feet. Slope—flat to very steep and at a few places precipitous. Aspects.—All aspects are represented: soil very variable from deep to very shallow and at places bare rock, but on the whole suited to tree growth. No leaf mould.	It is a huge forest covering over 140 square miles and hence the composition of the stock is naturally very variable. Pure or almost pure Khejra is found in the plains and portion near Dungarpur, while along the hill sides it is a mixed forest with varying proportion of teak and its companions. The growing stock is much mutilated owing to unchecked cutting and lopping in the past years. For the past three years the felling of all timber except of ploughs and deadwood for burning has been stopped, and in sheltered localities signs of improvement are already visible. There are many dead and dying teak and other kinds of trees.	The forest is primarily reserved for shikar, but there is no reason why the dead and dying trees may not be cut and utilized. In an area so large with protection, there is sure to be a large number of such trees, and these should not be allowed to rot in the forest. The cutting of trees for ploughs, etc., should be allowed after permission of the Forest Officer only, and not as heretofore.
2	Chundanwara and Mal mata forest.	North—Sabli, Boklan, and Padarpal villages. East—Kamlia, Nolsam, Bichawara, Gamri Gendji and Karwar. South—Karwar, Gendwa and Rasta villages. West—State boundary.	Elevation—650 to 1386 feet. Slope—flat to precipitous Aspect—all aspects soil, shallow to deep, sandy to stiff clay. At places very precipitous, to bare rock. No humus.	A mixed forest of teak and its usual companions the Sadar, Dhaura, Robin, Khankra, Temru, Sevan, etc. The growing stock as usual is much mutilated except the young shoots that have come up during the last three years. Young shoots of teak, temru sadar, albizzias, dhaura and other species along sheltered ravines are already 10 to 15 feet high. That shows that with protection the forest will improve considerably. There are large grassy blanks. Bamboos have been over-cut.	Protection with Improvement fellingsare proposed. The bamboos suffering from over-cutting should have some rest.
3	Bahadur...	North—Semlia Ghutaka-gaon and Chandli villages. West—Chadauli, Dhodran and Jusawa villages South—Jusawa, Dhad-rora, Phopli ber and Bahuki bur. East—Baba-ki-bar to Semlia.	Elevation—600 to 814 ft. Slope mild to very steep. Aspect—all aspects, soil very variable but on whole fairly good. No leaf mould.	Same as No. 2, except that the proportion of Khair is somewhat larger. The stock is in the State also, but improving slowly under partial protection as the people now do not cut teak trees.	Same as No. 2.

Ambara forest.	North-west—Chikli, Sakotra, Kuva Sarana and Ghati-a-ka Gala. South West—State boundary and the Mahi river.	Elevation—400 to 650 ft. Slope gentle to steep. Aspect—all aspects. Soil from deep and rich to shallow and poor at places and bare rock.	A mixed forest of teak and its companions the Dhaura Khair, Sador, Khejra, Temru, Shisham and other species. The proportion of teak varies a good deal, but on the whole is fairly represented. The growing stock is very much mutilated, but young shoots of teak and other species are doing well. Bamboo is suffering from over-cutting. No shoots, but those of the current year, are found. There are many large grassy blanks. Same as the above.	Protection and improvement fellings are suggested, also planting up of blanks. Bamboo should be given rest.
5 Jalap forest.	North—Masta, Linkhi, and Samarwara. East—Samarwara, Pieth and the Bahadar river. South west—State boundary.	Elevation—600 to 770 ft. Slope—level to very steep and at places precipitous. Aspect—all aspects. Soil shallow to deep fertile; no humus.		
6 Richlan forest.	North and East—State boundary. South—The Mahi river. West—Lodawal, Gama and Dalpur villages.	Elevation—540 to 882 ft. Slope—level to very steep. Aspect—all aspects. Soil—deep and rich to shallow, rocky and poor. No leaf mould.	It is a mixed forest of Teak, Khair, Dhaura, Khejra, Bor, Sangri, Temru, Sador and other species with next to no bamboos. The stock is much mutilated and there are strong new shoots as in the forests described above, as this is comparatively on a dry soil and has not had the advantage of protection in the same degree. There are large grassy blanks.	Protection with improvement fellings are proposed.
7 Mahia forest.	North—The Mahia nala. South—Chikhli village lands. East—The Mahi river. West—Road from Galinkot to Chikhli.	Elevation—430 to 509 ft. Slope—gentle. Aspect—general eastern aspects. Soil—Fairly deep to shallow. No leaf mould.	A mixed forest of teak and its companions, much cut down at present and hence very open. But as it is situated on the bank of the Mahi it will prove a very valuable forest after a few years' protection.	Protection and improvement felling proposed.
8 Gurupla forest.	North—Paderi Chhoti and Surajpur villages. East—The Mahi river. South—Londor and Senlia village lands. West—Sagwara, Wardia and Warsingpur villages.	Elevation—450 to 651 ft. Slope—level to gentle. Aspect—all aspects. Soil—Generally poor, all good deep low ground being occupied by cultivation, but on the whole fairly good. No humus.	A mixed forest of Teak, Khejra, Temru, Hingot, Bor and other species, with large grassy blanks. Stock much mutilated, but new young shoots of teak are vigorous and promising.	Do.
9 Sagwara forest.	North—Padra village. East—Semlin, Surajpur and Sagwara villages. South—Gavari village. West—Thakunda and Vadra villages.	Elevation—760 to 974 ft. Slope—level to very steep. Aspects—all aspects. Soil from deep to shallow at places and bare rock at surface. No leaf mould.	Do. do.	Do.

APPENDIX II.

List of Trees found more commonly in the Forests of Durgarpur State.

No.	Name.	Local Name.	Uses to which may be put.
1	Acacia Arabica ...	Babul, Barwal ...	Cart wheels, agricultural implements, sugar-cane presses and house building.
2	" Catechu ...	Khaira ...	House posts, agricultural implements.
3	" Lenophloea ...	Khejra ...	Agricultural implements.
4	Adina Cordifolia ...	Haidu ...	Beams, doors, and for turning.
5	Aegle Marmelos ...	Billi ...	Beams, karis. Leaves for fodder, and fruits in native medicine.
6	Ailanthus excelsa ...	Arua ...	For floats on the Mahi ferries.
7	Albizia lebbeck ...	Sarin ...	For beams, oil and sugar-cane presses and for bangles.
8	" procera ...	Ghorar ...	Ditto.
9	Anogeisus acuminata ...	Kavra ...	Agricultural implements, carts, house building.
10	" latifolia ...	Dhaura ...	Ditto.
11	Balanites Roxburghii ...	Hingot ...	Fruits, and wood ashes used in native medicine.
12	Bassia latifolia ...	Mahura ...	Beams, flowers in manufacture of spirits and article of food. Seed for oil.
13	Banlinia purpurea ...	Kral ...	Flower eaten as vegetable. Wood for agricultural implements.
14	Bombax malabaricum ...	Semlia, Hemala ...	Scabbards for swords, pack-boxes and house buildings. May also be used as a help to raft heavy woods.
15	Boswellia thurifera ...	Salar, Halar ...	Charcoal for iron smelting for live hedges.
16	Briedelia retusa ...	Augnera ...	House building, turning and carving.
17	Buehanania latifolia ...	Charoya ...	Boxes and other furniture, yokes for bullocks. Kernel of seed exported and called chiraunji.
18	Butea frondosa ...	Khantra ...	Firewood, rough cordage from root bark, lac may be reared on it.
19	Carissa carandas ...	Kraunda ...	Firewood and hedges. Fruits eaten.
20	Casaria tomentosa ...	Amaltas ...	Agricultural implements and house building.
21	Cassia fistula ...	Shisham ...	Fruits used in medicine.
22	Dalbergia latifolia ...	Pihon ...	For house-building, furniture and carts.
23	" Sissoo ...	Temru ...	Ditto.
24	Diospyros melanoxylon ...	Umbia ...	"
25	" montana ...	Dhanla Khantra ...	"
26	Erythrina suberosa...		Firewood.

27	<i>Eugenia jambolana</i>	...	Jaman	...	...	House building and agricultural implements.
28	<i>Ficus bengalensis</i> ...	...	Bor	...	...	For shade and firewood.
29	" <i>religiosa</i> ...	...	Pipla	...	...	Ditto. Lac insect may be reared on it.
30	<i>Garuga pinnata</i> ...	...	Khapat	...	...	For beams. Fruits pickled.
31	<i>Gmelina arborea</i> ...	...	Sewan	...	...	Furniture and house building.
32	<i>Grewia vestita</i> ...	...	Dhaman	...	...	Ditto and carrying poles.
33	<i>Holarrhena antedysenterica</i>	...	Dhudhi	...	...	Carving and furniture. Seed used in native medicine.
34	<i>Lagerstromia parviflora</i>	...	Kakria	...	...	House building and agricultural implements.
35	<i>Mangifera indica</i> ...	...	Anba	...	...	Door leaves and beams. Fruit eaten.
36	<i>Mela</i> ...	...	Limbra	...	...	House building and furniture.
37	<i>Mimusops</i> ...	...	Khirmi Rain	...	...	Oil presses and turning.
38	<i>Odina wodier</i> ...	...	Gunjal	...	...	Beams and furniture.
39	<i>Ongenia dalbergioides</i>	...	Tanaj	...	...	Cart poles, agricultural implements.
40	<i>Phoenix sylvestris</i> ...	...	Khajur	...	...	Fruit for beans, juice for Gur and spirits.
41	<i>Phyllanthus emblica</i>	...	Ambla	...	...	Wood for agricultural implements, fruit for dyeing and eating, bark for tanning.
42	<i>Prosopis spicigera</i> ...	...	Sangri	...	...	Firewood also for well work.
43	<i>Procarpus marsupium</i>	...	Bia	...	...	House building and agricultural implements.
44	<i>Schbichera trijuga</i> ...	...	Kocham	...	...	Ditto ditto.
45	<i>Schrebera swietenoides</i>	...	Mekha	...	...	Ditto ditto.
46	<i>Soymda febrifuga</i> ...	...	Rohin	...	...	Ditto and Railway sleepers.
47	<i>Stephlegyne parvifolia</i>	...	Kalam	...	...	House building and agricultural implements.
48	<i>Sterculia urens</i> ...	...	Karali	...	...	Firewood and as a help for floating heavy woods.
49	<i>Tamarindus indica</i> ...	...	Inbli	...	...	Furniture, cart wheels, oil presses.
50	<i>Tectona grandis</i> ...	...	Sag	...	...	House building, furniture, railway sleepers, etc., etc.
51	<i>Terminalia Arjuna</i> ...	...	Arjan	...	...	Beams, karts, etc.
52	" <i>bellerica</i>	...	Balbera	...	...	Well work. Fruit for dyeing and medicine.
53	" <i>tomentosa</i>	...	Sador	...	...	House building and railway sleepers, etc.
54	<i>Vitex negundo</i> ...	...	Vana	...	...	Live hedges.
55	<i>Woodfordia floribunda</i>	...	?	...	...	Agricultural implements.
56	<i>Wrightia tinetia</i> ...	...	Khirmi	...	...	Turning, bangles, etc.
57	<i>Zyzyphus Jujaba</i> ...	...	Bor	...	...	Agricultural implements
58	" <i>nummularia</i>	...	"	...	...	Bed posts and walking sticks
59	" <i>zytopara</i>	...	Kat bor	...	...	Firewood

} Lac insect may be reared on these.

INTRODUCTION.

1. Crossing the Mahi on 18th September 1906, I entered Dungarpur State and reached Sagwara on 19th. The Forest Inspector arrived on 20th and on 21st; the inspection of forests was commenced, beginning with Gurapla. Leaving Sagwara, I proceeded through Galia-Kot, Chikhli Kuva, Pieth Dhambara, Genji, Mewara Gamri, Beechawara, Ratanpur, Chundanwara, etc., to Dungarpur where I reached on 7th October. Mahia, Ambara, Bahadar, Jalap, Chundanwara and Mal Mata forests were visited.

Leaving Dungarpur on 10th and inspecting Antri, Sagwara and Richhan forests, I crossed the Dungarpur State for Partabgarh forests on 20th October 1906.

2. Areas selected for reservation are, with three exceptions, the same that were previously notified to be reserved, but four of these, Jalap Ambara, Bahadar and Richhan, were given up probably for want of sufficient establishment.

Areas
selected for
Reservation.

The three blocks now proposed in Mahia is a strip of land about ten miles long and two to three miles broad along the Mahi river. Under protection this will become a very valuable forest owing to its being close to the river and easy for export purposes. The other two are Sagwara and Gurapla. These also are not very far from the Mahi, and contain a good deal of Teak, and with protection will become very valuable.

The proposed boundaries and the description about the state of growing stock is given in Appendix I.

3. At present Teak, Sador, Haldu, Temru, Dhaura, Khair Gharar, Sarin, Shisham (*Dalbergia latifolia*), Pilu (*Dalbergia sissoo*), and Babul are of commercial value, but there are also other kinds of good size which will be saleable if put into the market; these are Ambia, Bin, Rohin, Khojra, Kalam, Sewan, Jainan and Nim, etc.

Trees that
have
Commercial
value.

The list of more common trees found in the State is given in Appendix II.

Teak, Temru, Sador, Dhaura, Shisham and Khair, even when of small sizes, are saleable, though their value will considerably be enhanced if they are allowed to grow into large-sized trees, but there are others which, when of small size, are of little value; these are Ghorui, Sarin, Mohua, Nim, Babul, Khejra, Rohin, Khanjera, Haldu, Sowam, etc. Thus trees of the latter kind should be allowed to grow into at least six feet in girth before being felled, unless they are dying or unsound. Sound growing trees of the former kind should also not be felled before they are six feet in girth.

Fire Conservancy.

4. Fire should, as far as possible, be kept out of the forests as it is the chief enemy of the forest growth of all kinds. Measures undertaken to protect the forests from fires are :—

- (a) Clearing of fire lines along the outer boundary of the forests to prevent the fires lighted outside the forests from entering into them.
- (b) Clearing a net-work of intermediate fire lines so as to divide the forest into small areas to prevent the fire lighted in any one of the sub-divisions crossing into others.
- (c) To maintain a staff of fire watchers during the fire season, *i.e.*, after the grass has dried up to the beginning of the monsoon rains.

5. The width of fire lines depends on the height and density of grass, prevalence or otherwise of heavy winds during the season. The width may be anything between 40 to 100 feet, and sometimes even more. A width of 60 feet would be sufficient in the forests of this State.

6. The cost of protecting forests from fire in the Central Provinces is about 2 annas 6 pies per acre per annum, or Rs. 100 per square mile. The cost under the present financial state of forests is prohibitive, but the boundary fire lines may be kept clear, and also a certain width along the existing path or the compartment lines. Besides this, villages situated inside the reserves may have a line all round them cleared by the villagers if possible. This cordon should be burnt in the presence of the Forest Staff.

7. The people living inside or along the forests may also be given to understand that the lighting of fires will not be allowed to go unpunished. The villagers who conceal the offenders or do not help in finding out the culprits may have their rights, over the area burnt, suspended for a period not exceeding five years at the discretion of the Durbar.

8. Small rewards may also be given to the villages in case of the forest, in which they have rights, escaping from fire.

9. Fire lines should only be burnt at night time, because any sparks that may be carried away by the wind are easily noticeable. The heat during the day time is also against the carrying out of this operation.

Rights and their Regulation and Restriction.

10. The people used, till of late, to cut anything they liked and in any way they liked, but since the last two or three years efforts have been made, and with some success, to protect certain kinds of trees; while the rest may still be cut at the sweet will of the people. The above restrictions are in two reserved forests, while no restrictions are imposed in others. I think that the *bonâ fide* needs of the villages, situated in the reserves or whose lands adjoin them, may be met, but only with the permission of the Forest Officer. The huts are made in a most wasteful manner, and the efforts of the Forest Staff to induce the Bhils to build mud walls will considerably reduce the demand on forest produce.

11. The rights may roughly be divided into two kinds :—

(1) Those for which no previous permission should be necessary are :—

- (a) Grazing for the cattle being the *bonâ fide* property of the holder.
- (b) Grass-cutting.
- (c) Dead and fallen wood for burning purposes.
- (d) Dead and fallen wood for sale on head-loads by the Bhils only.
- (e) Collection of wild fruits, flowers, honey, etc.

(2) Those rights for which previous permission of the Forest Officer may be considered necessary :—

- (a) Timber and bamboos for house building and for agricultural implements.
- (b) Green trees to be felled for firewood purposes, only in case of there being no dry fallen wood available in the forest at a convenient distance.

If these suggestions be accepted and carried out, the waste of material at present going on will be avoided, and consequently the corresponding increase in the material available for export and net surplus will be great during the first period of fellings.

12. The grass although plentiful cannot, under the present condition, be utilized, as the carriage from Dungarpur to Talod, the nearest railway station, is annas 12 per maund Imperial, and unless the hay can be sold there at Re. 1 per maund no profit can be got at.

Utilization
of Grass and
other minor
Produce.

Other minor produce are gums of Dhawra, Khankra Acacias, Karaili and Albizzias. Then there are roots such as Dhauli and Siyahmuslis; leases for the collection of which may be sold.

13. Large areas are covered with Khankra and Zyzypus, the species suited for lac culture. There is a large demand for this product, and the rearing of lac may be taken in hand. In this way the areas which are at present of little value may produce a large and profitable industry.

PART I.

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED.

1. The Dungarpur State is situated in the extreme south of Rajputana, and is bounded on the north-west by Mewar, in the east and south-east by Banswara, and south and south-west by the Rewa and Mahikantha States of the Bombay Presidency.

1. Name and situation

2. The country is mostly hilly with a few scattered level areas of small extent. The hills surround the State on all sides, and ranges of low hills also run through the centre of the State. The north and the eastern portion is comparatively poor in forest vegetation.

2. Configuration of the ground.

3. The drainage of the country is carried out, viz.:—

- (a) The northern portion is drained by the river Som—and its branches—which has its rise in the Mewar State, for the greater portion form the northern boundary of the State.
- (b) The drainage of the central portion is carried out by the Moran Nala which joins the Mahi a little above Galia-Kot.
- (c) The southern and south-western portion is drained by Bahadar and Majam rivers with their tributaries.

These all flow into the Mahi river which forms the eastern and southern boundary of the State for over fifty-five miles. The Som and Moran join the Mahi within the Dungarpur territories, while Bahadar and Majam and its branches join it in the Bombay Presidency.

4. All these rivers depend on the monsoon rains for water, and run for various lengths of time according to the mildness or severity of the monsoon, and are quite dry during the greater part of the year.

5. The underlying rock in the State is mostly sand-stone; at places granite and other shales are also noticeable. The soil for the most part is sandy loam, except when shale comes in, when the proportion of clay is comparatively larger. In such places Sadar appears in comparatively larger proportions, and of fairly big sizes. The soil is very variable in its composition, from almost pure coarse sand to fine clay are noticed, but on the whole it is nowhere unsuited to tree growth. In places rock crops up at the surface, and in such, no vegetation can, of course, be expected, but these are not numerous or very large in area.

3. Underlying Rock and Soil.

6. The climate is the usual climate of southern Rajputana.

Climate.

The lowest temperature is in January and the highest in the month of May. The daily average temperature of the year is maximum 91°, minimum 72°. The average annual rainfall is twenty-five inches, but it varies considerably, it being only ten inches during the famine year.

7. The agricultural customs and wants of the people are simple, and the wants of the population are limited chiefly to timber of small sizes. Timber over eighteen inches in girth is very rarely used, and then too, in small quantities, and a length of over twenty feet is rarely demanded.

5. Agricultural customs and wants of the people.

8. Owing to the large supply which is still available, and to the absence of any restriction, till of late, more forest produce is at present consumed than is absolutely necessary for the well-being of the people. As there is no data about the timber and firewood used per head of population, I quote the quantities used in the Central Provinces where the people inhabiting the area round forests are of similar stock, and have the same customs.

					Quantity used per head of population per annum.
Wood and bamboos for building and for agricultural implements					Maunds.
...	...	...	...	...	4
Firewood...	...	...	...	...	5
Total					9

The grass is so plentiful and of no value, that I do not consider it worth while to say much about its consumption.

9. The trees at present in use by the people are Teak (*Tectona grandis*), used as rafter wood beams and up-rights in houses. The leaves are for thatching, and for harvesting small grain such as Kuri, etc.

Sador (*Terminalia tomentosa*) for rafter and beams, Temru (*Diospyros melanoxylon*) for beams, poles for carts, rafters and ploughs, etc.

Khair (*Acacia catechu*) for house posts and agricultural implements. Babul (*Acacia arabica*) for carts and Persian wheels and other agricultural implements.

Khejra (*Acacia leucophloea*) for agricultural implements and Persian wheels.

Haldu (<i>A. Cordifolia</i>)	} For beams for house building.
Rohin (<i>S. Febrifuga</i>)	
Ghorar (<i>A. Proserpi</i>)	
Sarin (<i>A. Lebeck</i>)	

and the last also for bangles; Dhaura for plough and agricultural implements.

Mokha (*Schrebera swietonoides*) for beams, bark eaten in times of scarcity; Mahua (*Bassia latifolia*) for beams; Kakria (*Lagerstemia parviflora*) for rafters and agricultural implements; Shisham (*Dalbergia latifolia*) for furniture and beds, etc.

Bans (*Dendrocalamus strictus*) for roofing walls of Bhil huts, mats, baskets, fencing, etc.

10. Generally speaking the demand on the forests for the requirements of the people is:—

Wood and bamboos for building, agricultural implements, furniture, carts, mats and baskets and for fuel.

Grass for thatching, ropes, fodder and grazing.

Tanning, chiefly the leaves of Dhaura bark of Sador, Khejra and Babul.

Manufacture of spirits and articles of food	} Flowers of Mahua.
Manufacture of oil ...	
...	Seeds „ „

Besides the above, fibres are produced from the bark of the roots of Khankra, and the leaves used for thatching and other purposes; gums as medicines, etc., roots are eaten or exported.

Composition and Condition of the Forests.

11. The forest is distributed all over the State, it being richer in the central and south-western portions, while in the north it is rather poor. The area of the forests reserved and proposed to be reserved is about 600 square miles, which includes about 100 square miles of cultivation, the remaining purely forest area being 500 square miles, which is a little more than one-third of the total area of the State, 1,447, square miles, of which square miles is under cultivation. The country is pre-eminently a forest country. Almost all the suitable land for cultivation in the forests is taken up, and hence no extensions on a large scale are possible. The Bhil community, the most numerous one in the State, is dependent on forests, and hence for their welfare the forests should be maintained, as well as for the more valuable reason of maintaining the water supply and attracting rains.

1. Distri-
bution and
Area.

12. The boundaries of the two forests, Antri and Chandrawara Mal-matha reserved forests, have been demarcated by large stones painted with coal tar, but these boundary marks are neither substantial nor close enough to be seen from each other, therefore, it is necessary that pillars be erected at distances at which they can be seen from each other. Also a line about sixty feet wide should be cleared and kept up permanently which may also serve the purpose of fire lines.

2. State of
Boundaries.

Similar boundary marks may also be erected for the newly proposed reserves, and the consecutive numbers cut on the pillars.

For the present, numbers are allotted to the pillars in the register of boundaries, but corresponding numbers are not cut on the pillars, and should now be done.

13. All land in the State not given up for cultivation is owned by the State, and hence it is the sole master of the forests.

3. Legal
position.

14. Hitherto there has been no check whatever on the forests or their produce, but for the past three years certain protection has been given to the forests reserved. Cutting of Teak has been prohibited, and of other species only for agricultural implements such as ploughs, etc., has been permitted to be cut without permission. The cutting of bamboos has been prohibited without payment in the reserves. In the Antri forest even timber for building has been prohibited. This shows the people have no real rights, but privileges enjoyed for centuries should, I think, be respected, and it may be said that villages situated inside the reserves or adjoining the reserves have right to :—

4. Rights.

(a) Timber and bamboos for house building and agricultural implements, except in Antri forest where they have only for agricultural implements.

(b) Firewood.

(c) Grass, grazing and other minor produce for their *bona fide* personal wants and not for sale or barter.

15. The crop is as usual a mixed one of the low hill type; speaking broadly there are three types represented in the areas to be reserved :—

- (i) The low grounds are either 'pure' Khankra (*butia frondosa*) where the drainage is not quite free, but as soon as this passes into the soil with free drainage, Teak and its companions also come in, or where the soil is light and comparatively poor, Khair, Khejra and Zyzyphus take the place of Khankra.
- (ii) On old abandoned village sites, Khejra, Babul and Zyzyphus are met with.
- (iii) The usual mixed forest of Teak and its companions such as Temrú, Dhaura, Khankra, Khair, Sador, Rohin, Haldu, Umbia, Pihu (*dalbergia sessoo*) Nim, Shisham, Mokha, etc. Jaman, Ghorar and Arjan, etc., being found only along the banks of the streams. Salar is not so common in the forests of the State as in Banswara and Partabgarh so as to form a separate type, but it is met with here and there. There are large grassy blanks in the forests, but some of these are being covered with natural seedlings in the small protection afforded in the three years. Where fires have not entered, poles of twenty to thirty feet high are met with in sheltered localities along the streams. The leaf canopy is very various and of all shades. In some places dense thickets, eight to ten feet high, of Dhaura and Rohu, have come up. This speaks favourably about the protection afforded during the past three years.

16. The forests not having been under systematic working, all the valuable species have been hacked in a most reckless manner, and almost all are on bad and mutilated basis.

No trees of any size of the valuable species are met with except a small patch of mature trees along the Mewara Nala, which contains fairly large trees of Ghorar, Temru, Sador and Bahera.

From this it appears that if left standing in suitable localities these trees would grow into fine tall trees capable of yielding timber of good dimensions.

17. The trees cut were badly mutilated in a manner that no stumps were found fit for counting annual rings. I counted annual rings on four Teak poles thirty-six inches in girth cut for Dhambora Police Station, and found that they contained on the average nine rings per inch of radius of fifty-four years old.

The Teak is the most valuable of species, but in this State it is near its northern limit and cannot be expected to grow into anything like the dimensions it attains in its proper home; even near temples no trees of any size have been found.

18. No data are available as to the production per acre of the produce of various descriptions

Only a part of the produce is timber of certain species, and is at present not saleable owing to the great distance from the centres of consumption and the absence of good roads. These grow in the forests in various proportions; at places only scattered specimens of saleable kinds being met with, at others they form the majority of the crop. At present owing to the condition of the forests and mutilated nature of the existing

stock, it will not be advisable to remove more than a ton of small timber per acre, but with protection this will increase to three or four tons or even more.

19. Annual fires are the greatest danger to which the crop is at present liable, which kill or cut back the young trees, but by injury to the bark and wood of the older ones, render them more liable to the attacks of insects and fungus, and their wood is not so useful as without such injury.

6. Injuries to which the crop is liable.

20. In exceptionally dry years the crop is liable to suffer from drought. In the famine year 1899, a large number of Teak and other trees dried from this cause, of which a good many are still standing in the forests.

System of Management.

21. The Forest Department has been created in the State since the last three years or so. Before this there was no management, but a little time before the establishment of the Forest Department, a royalty or customs duty was begun to be levied on all forest produce exported from the State.

1. Past and Present System of Management.

22. When the Forest Department was organised, the Forest Inspector got sanction to levy a small royalty on timber. Now every cart of timber exported has to pay Ans. 12 royalty to the Forest Department and Rs. 2-3 customs duty to the Customs Department. I do not see the use of this double system of duties. The timber brought from the State forests ought to pay royalty, but the State, I think, ought not to charge customs on the produce it sells itself; therefore, I think that only one duty should be levied, say Rs. 3 per cart load, and the revenue credited to the Forest Department. It matters little whether it will be collected by the Forest or Customs Department.

23. At present no green timber is allowed to be cut and exported; only dead Teak and Sadar trees are allowed to be cut.

24. None carried out.

2. Special works of Improvement undertaken.

25. The revenue derived from the State forests, and the expenditure incurred on them, have in the past been very small. In 1905-06, the total receipts from forest produce of all kinds, collected through the Customs and Forest Departments, were Rs. 2,100.

3. Past Revenue and Expenditure.

Utilization of the Produce.

26. The marketable products are:—

- (a) Timber of various species, such as Teak, Sadar, Temru, Albizzias, Lebbeck and Proeera, Haldu (*adina cordifolia*), Dalbergia, Sissoo and latifolia, Bassia latifolia, Acaia, Catechu Arabia and Leucophloeæ, Melia Indie and Rohin, etc., are available, though at present only in small quantities and of small sizes.

1. Marketable products: quantities consumed in past years.

- (b) Firewood in large quantities.
- (c) Bamboos.
- (d) Minor products such as gums of sorts, roots, fruits, flowers and honey, etc.

27. There is no data as to quantities consumed during past years.

2. Lines of Export.

28. Up to this the produce has been exported by head-loads to the adjoining States of Rewa and Mahi Kantha by the Bhils, and by carts from Mewara and Ratanpur to Morasa and Ahmedabad in the Guzerat.

The places of consumption are far off, and the carriage of small timber by carts is necessarily costly, hence only small quantities have been carried by carts. The roads are bad and, therefore, carriage is difficult.

29. The forest area in the State is intersected by many streams, and the chief river, the Mahi, is not far from five of the proposed reserves. The streams can, in ordinary years, be utilized for floating timber. The timber may be cut and collected along the banks of the streams, and as soon as they begin to flow it may be launched and taken down where the Mahi crosses the Railway line. It will certainly pay to take down timber in the Mahi and other streams, but it is not certain whether it would pay to float firewood or not. The experiment may, however, be tried, and if it succeeds then the large quantity of firewood that is at present being wasted will be utilized, and the question of improving the forests within a reasonable time be rendered easier.

3. Markets.

30. Guzerat is the only market; but the quantities of timber and firewood in Ahmedabad and other large towns are very large, and if the State can put in these markets the product of its forests there ought to be no lack of buyers.

4. Mode of extraction and its cost.

31. As the extraction has been done solely by private persons, and not departmentally, there has been no charge on extraction.

5. Net value of each class of produce.

32. As no departmental operations have been undertaken, this cannot be ascertained, but the rates of royalty charged for different kinds of products are :—

TABLE.

Miscellaneous Facts.

33. The Forest Staff entertained at present annually, is :—

1. The
Forest Staff.

	Rs.
1 Forest Inspector @ Rs. 25 per month ...	300
3 Havildars @ Rs. 8 per month each ...	288
1 Moharrir „ „ 10 „ „ ...	120
25 Forest Guards @ Rs. 4 per month each ...	1,200
Total ...	<u>1,908</u>

34. As no works have ever been undertaken it cannot be said for certain whether labourers, in sufficient numbers, will be available for the various forest works or not. The Bhil community have from remote times existed upon forests, and they are the only labourers available at present. They do not seem to like the idea of felling and converting large trees, even when growing close to their huts, as it involves much labour; dead trees of valuable species have been noticed standing close to their villages unutilized, while only small branches are cut and taken away. At places it has been noticed that to get rid of them they are set on fire. Efforts should be made to train them to the use of saw and, as far as obtainable, large trees should be granted to the right-holders for their personal use.

2. Labour
supply.

PART II.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

1. Basis of
Proposals.

35. The proposals are based on the assumption that the forests require protection and improvement in the first place; and that not more than one ton of small timber per acre absolutely from dead, dying, malformed and stunted trees be extracted; that the firewood-yielding trees should not at present be exploited, except so far as they be interfering with the growth of more valuable species.

36. That leaving the reproduction of areas covered by tree growth more or less to nature, grassy blanks to the extent of 300 acres per annum be sown or planted with Teak, and nurseries be established to fill up the blanks caused by failure in the areas sown.

37. That special fire conservancy measures be adopted in a few selected forests, owing to the cost being prohibitive in the present financial state of the forests.

38. That lac culture may be taken in hand owing to the presence of trees suitable for rearing of lac over large areas.

2. Working
circles, how
composed;
reasons for
their forma-
tion.

39. It is proposed to form each of the proposed nine reserves into a separate working circle so that the requirements of the villagers may be met with at reasonably convenient places from their homes.

That the labourers may not have to go far away from their homes, which they do not like.

Each reserve may be divided into fifteen compartments, and each compartment be taken up consecutively each year.

The object required in each of these working circles is the same, *i.e.*, improvement of the growing stock and utilization of any malformed trees cut to the best advantage.

40. With the exception of the Antri forest, which primarily is to be maintained for the protection of game, only dead and dying trees will be removed.

The remaining eight working circles will yield a variety of material from dead, dying and malformed or stunted trees to be cut back.

41. The working circles thus will be :—

- (1) Antri.
- (2) Chundanwara Malmatha.
- (3) Bahadar.
- (4) Ambara.
- (5) Jalap.
- (6) Mahiya.
- (7) Sagwara.
- (8) Gurapla.
- (9) Richhan.

42. All undemarcated forests, which should include all waste land not assessed to land revenue, should be formed into a separate working circle.

43. The whole forest area requires one treatment, i.e., protection and improvement, but as the requirements of the local population have to be considered, and the concentration of the work will moreover imply the collection of large numbers of labourers away from their homes, it is therefore necessary that the working be made to suit all conditions. Hence the proposal that each forest may be constituted into a separate working circle.

44. It is proposed to divide each of the nine forests into fifteen compartments more or less of equal sizes. The boundaries of these compartments may be fixed to prominent ridges or ravines or paths or straight lines cut across the forest, which may serve as fire lines as well as lines of export. No attempt is made to make compartments according to the growing stock, nor is this necessary, as the growing stock is so variable that compartments, if attempted to be made, will be of very irregular shape and various sizes.

3. Compartments and justification of the subdivision.

45. As it is proposed to take out the present mutilated and deformed stock in thirty years each portion is to be gone over twice after an interval of fifteen years. It is better to have the compartments corresponding to the coupes of yearly fellings.

46. The crops consist of much mutilated growing stock, and with inferior species less mutilated; crop valuation is useless at present owing to remoteness of the centres of consumption.

4. Analysis of crop: method of valuation employed.

47. As it is simply proposed to improve the growing stock area check with the removal of only those trees that can strictly, with due regard to sylvicultural conditions, be removed, it is considered sufficient.

Detailed valuations under this simple treatment are not considered necessary.

Method of Treatment.

48. The object sought to be attained is to maintain these lands as forests, to act with beneficial influence in attracting rains and maintain the water supply, which, in a locality depending solely on rains for its water supply, is no small factor; and to yield as much revenue to their owner as may consistently, with due regard to the above and the wants of the local population, can be obtained, provided their condition as forests is maintained but improved as well.

1. Object sought to be attained.

49. The object sought after is the same in all the working circles. The trees required to be removed should be marked and then cut and exported. If purchasers can be found for the standing stock, the department will be saved the trouble of cutting and exporting it to the markets, but in the beginning at least, the work will have to be done departmentally so that the people may know that it pays, and private individuals will come in to buy the standing stock.

2. Method
of Treatment
adopted 1.

50. If the whole produce were saleable the simplest method to adopt would be coppice with standards, but as it is not, and only a portion of the produce is saleable, it is best to adopt the improvement-felling method. This method differs from the coppice one only in the intensity of its operations. The coppice with twenty to twenty-five standards would be left standing per acre, and the whole remainder cut out, while in the improvement-felling method only those trees that are malformed and stunted will be taken out, or some trees of the inferior species which are actually interfering with the promising specimens of the more valuable species.

3. Exploitable age

51. No data are available to fix the exploitable age of the crop; there are next to no mature trees of the species that are at present saleable. The forests having been open to all who had the inclination to cut and take away anything he liked; the trees have been treated in a most barbarous manner. If a piece of wood two feet in length of certain dimensions was wanted, no attempt was made to cut a tree but to climb up and cut exactly what it suited the person, and thus destroy the whole fine tree and so on.

52. As the local requirements are chiefly of small poles and sapplings, the valuable kinds of trees such as Teak, Sador, Dhaura, Temru, Shisham, etc., are not allowed to grow beyond those dimensions.

53. It is not necessary in the present proposals to fix the exploitable age, as the main thing sought after in the present proposal is to put the forests on the way to improvement. Only dead, dying, unsound, and malformed trees of valuable kinds, and the individuals of less valuable kinds that are actually interfering with the growth of their more valuable companions will be removed.

54. After fifteen years for which period these proposals are framed, the condition of the forests will have considerably improved, and data about the rate of growth collected by the Forest Staff will be available. Then it will be time to decide about the exploitable age of the crop.

The Fellings.

1 The
General
Working
Scheme
calculation
of the possi-
bility.

55. The working scheme will be similar in all the working circles with this exception that in Antri only dead and dying trees will be removed. Of the 500 square miles about one-fourth is grassy blanks, and about seventy square miles comprises Kbankra and other species not at present saleable. The remainder, about 300 square miles, comprise such species that are saleable. It is proposed not to take out more than one ton per acre of small timber in the first fifteen years, except Antri, where half-a ton per acre will be extracted and, therefore, the total yield will be:—

				Tons.
100 square miles	= 64,000 acres @			
	$\frac{1}{2}$ a ton per acre =	...	...	32,000
200 square miles	= 128,000 acres @			
	1 ton per acre	...	...	128,000
	Total	...	...	<u>160,000</u>

56. Out of this the department has to meet the requirements of the right-holders, *i.e.*, villagers living inside or adjoining the forests proposed to be reserved. Assuming that one-third of the population of the State has a right to the produce of these forests, or say in round numbers 35,000 souls, and taking the Central Provinces' figures for the quantity required per head of population per annum, *i.e.*, four maunds, the total for the right-holders is :—

$$\frac{35,000 \times 4 \times 15}{27} = 77,770$$

or say 78,000 tons during the whole period of the first fifteen years, leaving a surplus of $(160,000 - 78,000) = 82,000$ tons for export or sale. The wants of the remaining population will be met from the undemarcated forests, or if any be taken from these forests it will have to be paid for at the usual rates.

57. Besides the above there will be a large quantity of firewood available for sale, but as the demand for this kind of produce does not exist, it is, therefore, necessary to calculate the possibility of this produce.

If possible, the portion of trees felled in Improvement-fellings which cannot be utilized as timber, and dead and fallen trees of trees yielding only firewood, should be disposed of as firewood or turned into charcoal.

58. The bamboos in this State are suffering very much from over-cuttings; no shoots, except those for the current year, were noticed. It is proposed that at least for one year to come, no bamboos should be allowed to be cut, and then worked on a rotation of five years. The area cut one year should have a four years' rest before it is again opened for cutting. In this way not only the stock will be improved but bamboos better suited for different purposes be obtained. It is estimated that after meeting the local requirements 30,000 bamboos per annum will be available for sale.

59. The fellings are prescribed for a period of fifteen years, towards the close of which the scheme may be revised.

2. Period for which fellings are prescribed.

60. The area to be felled annually is approximately one-fifteenth of each of the nine working circles. As the forests have not all been demarcated nor compartments marked off on the ground, the order of their allotment cannot be given, but it is proposed to work consecutively all the compartments marked, Compartment No. 1 during the 1st and 15th on the last year of the period.

3. Areas to be felled annually or periodically, in the order of their allotment.

61. It is proposed to work the forests on the Improvement-felling method. The trees to be felled will be marked by the Forest Officer who, while marking trees, will observe the following rules:—

4. Nature and mode of executing the fellings.

- (1) No sound growing tree of any of the timber-yielding species will be marked for felling on any account.
- (2) All dying, malformed or unsound trees of timber-yielding species will be marked for fellings provided :—
 - (a) No isolated tree, however malformed or unsound, be marked.
 - (b) No tree standing on a precipice or very steep ground be marked.

- (e) No trees standing on the border of a large blank be marked.
- (d) The removal of the tree marked should not cause a large opening after the trees are felled.
- (3) The trees of species not yielding timber be only marked for felling or girdling when they be actually interfering with the growth of promising individuals of more valuable species, or are likely to interfere within a short time.

62. The trees should all be cut flush with the ground and the stools properly dressed. The central portion of the stools should be slightly raised to allow the water not to collect on the stools. In the case of small stools and those growing on a sloping ground the stools may be cut slanting. In case of trees over six feet in girth which are not likely to produce coppice shoots, the stools need not be cut too close to the ground or dressed properly.

63. Cutting and transport will have to be done departmentally in the beginning, at any rate, till private individuals come in to buy the standing stock. Whatever agency be employed, the department should see that stools are not cut too high, and are properly dressed.

64. In the undemarcated working circle the only restrictions to be imposed are :—

- (I) The following kinds of trees may not be cut without permission in writing of the village headman or such other person whom the Kamdar may appoint if the headman be not considered competent, or has abused the authority vested in him :—

- (1) Teak (*Tectona grandis*).
- (2) Sador (*Terminalia tomentosa*).
- (3) Mohura (*Bassia latifolia*).
- (4) Temru (*Diospyros melanoxylon*).
- (5) Nim (*Meila indica*).
- (6) Ghorar (*Albizia procera*).
- (7) Sarin (*Albizia lebbek*).
- (8) Babul (*Acarica arabica*).
- (9) Khejra (*Acacia leucophloea*).
- (10) Haldu (*Adina cordifolia*).
- (11) Rohim (*Soyimida febrifuga*).
- (12) Khair (*Acacia catechu*).
- (13) Jaman (*Eugenia jambulana*).

- (II) All other kinds of trees may be cut for their *bonâ fide* personal requirements, but not for sale or for barter. They may also lop the trees except the thirteen kinds mentioned, provided no tree less than hâth in girth is lopped. The Bhils may also take head-loads of dry, fallen wood for sale. The practice of cutting down young Khejra and other trees merely to feed a wretched goat or two should be stopped.

65. The trees of the thirteen kinds mentioned above may be allowed to be cut for *bonâ fide* personal requirements by the village headman or other

person appointed by the Kamdar, but no trees less than a hath in girth should be permitted to be cut except when there be no tree of that girth available in the forest.

66. No trees be cut for sale or for barter in this circle except with the permission in writing of the State Kamdar.

67. After conclusion of fellings proposed during the first period, there will be improved stock of one to fifteen years, and more in age of more valuable species, consisting :—

5. Forecast of condition of crops at their conclusion.

- (a) Of coppice shoots from the stools of the trees felled in Improvement-fellings.
- (b) Of self-sown seedlings that will spring up round seed bearers of the various species.
- (c) The trees preserved in the first fellings. These with better protection will enhance the capacity of the forests considerably, and material available for removal during the second period will be at least two to three tons per acre instead of one ton proposed to be removed during the first period of fellings. Moreover, owing to the quality of the stock available being improved, the rate realizable per ton will also be higher than at present.

Supplementary Regulations.

68. The result of protection from fire and other causes will be that, along with valuable species, other undesirable kinds of vegetation such as climbers, etc., have also better chance of reproduction. Sometimes less valuable but more pushing species get an upper hand of the more valuable ones and thus call for the assistance of the Forester. Climbers and creepers more especially of larger kinds, render their victims of little value and retard their growth to such an extent that unless relieved in time even their life is in danger; these should be cut down. Once in five years will be enough for this purpose as well as for helping the more valuable species against their less valuable assailants. Bamboos will also have a better chance of spreading with the protection from fire, and may sometime suppress Teak and other valuable trees which should be relieved by the cutting down of such shoots as lie suppressing them. Again individuals of the same species may be growing too close for their development; then these should be thinned out, but I am afraid this will not be necessary during the first period except in rare cases.

1. Cleanings, thinning, and other improvement fellings.

69. The grass in forest lands and even outside the forests is too plentiful, and at present of no value; the cattle in most cases not numerous enough to cause any apprehension in the near future, but there is no forest which may be considered free of grazing rights. This right may safely be admitted, but the number of cattle possessed by each village should be enumerated and recorded. They may at the same time be allowed an increase of fifty per cent., and in the case of Bhils who have very few cattle even cent. per cent. over the number so thus recorded. Any

2. Grazing and other rights.

excess over and above this should, if admitted in the forests, be paid for; but certainly there should be no right to graze any cattle above the number allowed for.

This is necessary because grass and grazing may become more valuable in the future by the opening up of the country by better roads, and probably by railway in the future, however remote.

70. Other rights may be summarised as under :—

(a) Timber, usually small poles and saplings, bamboos for house-buildings, and agricultural implements.

(b) Firewood for burning and for sale in head-loads by Bhils in the surrounding villages and towns. Minor produce such as gums, lac, flowers, and fruits honey.

The last when exported has to pay customs duties, but forest tribes such as Bhils, if they export any of these products, generally do it in small quantities on their heads; and as they generally do not go by the public path, not feeling the necessity, the customs duty more often is not paid at all. The Forest Inspector told me that during the last season most of the gums that were taken to Kherwara for sale had not paid any customs duty; therefore, if possible, a small fee be charged per man allowed to collect gum or other minor produce removed for sale.

3. Sowing, planting and other works special to each circle.

71. The areas that are under tree growth may, for the present, be left to nature for their reproduction, assisted by wounding the soil round seed bearers. With protection from fire the self sown seedlings, which under the existing condition has no chance to grow, will cover the small gaps. The large grassy blanks are found in all the forests and may be taken up first for artificial regeneration. Lines twenty feet to thirty feet apart may be prepared and sown with teak seed at a cost of Rs. 3 per acre. On an average 300 acres may thus be planted per annum during the first period of fifteen years. Nurseries may also be established in each of the forests in which planting is resorted to, so as to have sufficient number of seedlings available to fill up failures in the sowings. The nurseries should be selected in places where water be available for watering the planting when necessary.

These small nurseries should not cost more than Rs. 150 per annum.

Proportion of more valuable species such as Shisham, Ghorar, Teak, etc., may, whenever possible, be increased by means of wounding the soil round seed bearers by broadcast, cheap sowings in favourable localities suited to the particular species, or by planting and cutting, for instance, of Ghorar along the nullah banks.

4. Improvements common to whole areas.

72. The forests should be opened out by roads, as with protection the growing stock is bound to improve, and in time even large timber will also be available, and unless the forests are opened out, produce could be extracted economically. Moreover, it will be found cheaper to lay out the roads now and keep the lines clear, when the forest is rather open, than to cut the thick forest afterwards. These lines may be kept clear and as funds are available turn it into cart tracks or roads.

These lines should, as far as possible, be made to conform with the boundaries of compartments so that they may serve more than one purpose.

- (a) Export lines.
- (b) Compart lines.
- (c) Fire lines.

Foresters and Forest Guards' huts may also be built in suitable localities.

Miscellaneous.

73. There being a large and growing demand for lac, and the species suitable for lac culture, but otherwise valueless covering large areas in the forests of the State, it is proposed that the rearing of lac on these species be taken in hand. These species are given in a descending order of their prevalence :—

1. Miscellaneous descriptions.

- (1) Khankra (*butia frondosa*).
- (2) Bor and Kat bor { *Zyzyphus jujaba*.
 " *nummalaria*.
 " *zylopara*.
- (3) Pipal (*ficus religiosa*).

The insects which grow on these three different species are different, and different kinds of seed be obtained and propagated on the respective kinds of trees on which they flourish.

74. At present the head of the Forest Department in the State is Inspector-Jamadar Samandarkhan, drawing Rs. 25 per mensem. So far as protection is concerned he is quite able to look after the forests; but the present proposal will necessitate, not only the protection, but intelligent carrying out of the proposals. The boundaries of the forests will have to be marked on the maps, and the lines for export and fire conservancy laid out on the ground and on the map. Nor does the present officer know anything about sowing.

2. Changes proposed in the Forest Staff.

For all these a trained officer will be required. His pay may be fixed at Rs. 60 to Rs. 150. There should also be three Foresters. The present Forest Officer may be one, and two others appointed on Rs. 15 each.

The present staff of three Havildars and twenty-five Forest Guards looks after two reserved forests, Antri and Chundanwara, Mal Mata forests, and for the remaining seven forests a staff of eighteen Forest Guards is proposed, three each for Jalap, Ambara and Bahadar, one for Mahia, two each Sagwara and Gurapla and four for Richhan.

Again the pay of the Forest Guards on Rs. 4 each is very low, and it is not expected to get good men on that pay. It is proposed that two Forest Guards be on Rs. 10, three on Rs. 8, five on Rs. 7, five on Rs. 6, and the remaining on Rs. 5 per mensem.

There should be four peons on Rs. 5, one Muharrir on Rs. 10 may also be added, and a clerk on Rs. 25.

Thus the total charge will be :—

	Rs.
Share of Superintendent's pay and that of his staff	1,200
Pay of Forest Officer, say on the average on Rs. 90 per mensem	1,080
Pay of Clerk @ Rs. 25 per mensem	300
Two Munshis „ 10 each	240
Three Foresters on an average on Rs. 25 each, per mensem	900
Two Forest Guards on Rs. 10 each per mensem ...	240
Three „ „ „ 8 „ „ ...	288
Five „ „ „ 7 „ „ ...	420
Five „ „ „ 6 „ „ ...	360
Thirty „ „ „ 5 „ „ ...	1,800
Total ...	<u>6,828</u>

per annum, or for the whole period of fifteen years, Rs. 1,02,420.

3. Financial
results of
proposed
workings.

75. The financial results of the proposed workings during the first period of fifteen years are :—

I. Receipts.	Rs.
82,000 tons of small timber @ Rs. 3 per ton ...	2,46,000
40,000 „ firewood @ ans. 8 per ton ...	20,000
450,000 bamboos @ ans. 5 per ton. ...	1,400
Grass, grazing and other minor produce ...	1,560
TOTAL RECEIPTS ...	<u>2,83,000</u>

II. Charges.	Rs.
Demarcation	14,000
Sowing, planting, establishment of nurseries and lac culture	18,000
Roads	12,000
Buildings and their up-keep	3,500
Cleaning, thinnings and other Improvement- fellings	15,000
Fire conservancy	28,000
Purchase of tools and plant	2,000
Pay of establishment	1,02,420
Travelling allowance	18,000
Contingencies	8,000
TOTAL CHARGES ...	<u>2,20,920</u>
Net Surplus ...	<u>62,080</u>

It may be noted that the rates at which the produce is saleable are quoted, and no allowance has been made for realization of better prices on opening of the roads. The cost on cutting and export and the corresponding increase in the value of the produce, when taken to markets by departmental agency, has been ignored, as no data are available for different kinds

of works such as felling, carting, rafting, etc. Efforts were made to send down some timber and firewood in a raft in the Mahi, but it failed owing to the Forest Inspector reporting at the last moment to the Kamdar that there was not enough water in the Mahi. Though on crossing the Mahi after twenty days of the receipt of that reply, I found that there was sufficient water; but perhaps the Forest Inspector's idea of sufficient water is different, as he has never seen a raft before being taken down the river.

76. As the proper compilation of working plans depends on the data available, it is proposed that the records and control books should be kept up, as far as possible, in accordance with forms prescribed by the Forest Department Code.

4. Collection of data and up-keep of records and control forms.

77. To obtain information regarding the rate of growth of different species, composing the crop, it is suggested that two or more sample plots of say, half-an acre each, may be marked out in all the forests, and measurements of girth at four and a half feet from the ground be taken yearly and recorded in a book.

Sample plots.

To ensure the measurements being taken at the same place year after year, a broad band of white paint should be painted round every tree. The trees in the plot should be numbered, and the numbers allotted to the trees be painted on tin plates which should be nailed on to the trees.

78. The area burnt in any forest should be noted in the Fire Conservancy Register, and tracings of each forest showing the compartments kept up for the record of fires. One tracing will suffice for five years' record.

Fire conservancy registers and maps.

Areas burnt during the 1st year of the period may be marked by parallel lines thus:—



That during the 2nd in vertical parallel lines thus:—



3rd year diagonal lines thus:—



4th year diagonal lines in
opposite directions thus :—

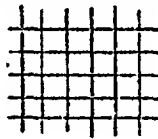


5th year dotted lines thus :—

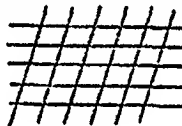


The above shows the state of any forest burnt during any one year of the period of five years.

An area burnt during the first year and also during the 2nd year will be shown thus :—

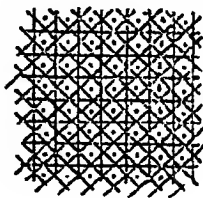


That burnt during the 1st and 3rd year thus :—



and so on.

Any area burnt five times successively in the period will show thus:—



Forest
Journal.

79. A Forest Journal showing work done in each of the working circles during the year, with its cost and the revenue if any realized, should be kept up. Any special features of the year such as dryness or otherwise, prevalence of hot winds, occurrence of frost, the number of compartments felled, the quantity of timber and other produce removed, should also be noted.

3. Control
Forms.

80. It is also proposed that Control Forms, as far as possible to conform with Forms No. 2 and 4 of the Forest Department Code, 6th Edition, be kept up.

APPENDIX I.

Description of Forests in Dungarpur State

No.	Name of Forest.	Boundaries.	Elevation, slope, soil, etc.	Description.	REMARKS.
1	Antri forest ...	North—Dungarpur town and village lands and Birpur village lands. East—Mando and War- dha, etc., villages South—Darbodnia, Ded- son Phapta, etc., vil- lages. West—Mevana, Versan Kangura and Pagran, etc., villages.	Elevation—700 to 1,403 feet. Slope—flat to very steep and at a few places precipitous. Aspects—All aspects are represented: soil very variable from deep to very shallow and at places bare rock, but on the whole suited to tree growth. No leaf mould.	It is a huge forest covering over 140 square miles and hence the composition of the stock is naturally very variable. Pure or almost pure <i>Khejra</i> is found in the plains and portion near Dungarpur, while along the hill sides it is a mixed forest with varying pro- portion of teak and its companions. The growing stock is much mutilated owing to unchecked cutting and lopping in the past years. For the past three years the felling of all timber except of ploughs and deadwood for burning has been stopped, and in sheltered localities signs of improvement are already visible. There are many dead and dying teak and other kinds of trees.	The forest is primarily reserved for shikar, but there is no reason why the dead and dying trees may not be cut and utilized. In an area so large with protection, there is sure to be a large number of such trees, and these should not be allowed to rot in the forest. The cutting of trees for ploughs, etc., should be allowed after permission of the Forest Officer only, and not as heretofore.
2	Chundianwara and Mal mata forest, ...	North—Sabli, Boklan, and Padanpal villages. East—Kamlia, Nolsam, Bichanwara, Gamri Gen- ji and Karawara. South—Karrwara, Gend- wa and Rasta villages. West—State boundary.	Elevation—650 to 1386 feet. Slope—flat to precipitous Aspect—all aspects soil, shallow to deep, sandy to stiff clay. At places very precipitous to bare rock. No humus.	A mixed forest of teak and its usual companions the Sadar, Dhauru, Rohin, Khankra, Temru, Sewan, etc. The growing stock as usual is much mutilated except the young shoots that have come up during the last three years. Young shoots of teak, temru sadar, albizzias, dhauru and other species along sheltered ravines are already 10 to 15 feet high. That shows that with protection the forest will im- prove considerably. There are large grassy blanks. Bamboos have been over-cut.	Protection with Improve- ment fellings are pro- posed. The bamboos su- ffering from over-cutting should have some rest.
3	Bahadur...	North—Semlin Chata- ka-gnon and Chandli villages. West—Chadauli, Dhod- ran and Jusawa villages South—Jusawa, Dhadi- ra, Phopli bor and Bahuki bar. East—Baba-ki-bar, to Som in	Elevation—600 to 814 ft. Slope mild to very steep. Aspect—all aspects, soil very variable but on whole fairly good. No leaf mould.	Same as No. 2.	Same as No. 2.

5	Ambara forest.	North-west—Chikli, Sakodra, Kuva, Sarana and Chati-a-ka Gala. South West—State boundary and the Mahi river.	Elevation—400 to 650 ft. Slope gentle to steep. Aspect—all aspects. Soil from deep and rich to shallow and poor at places and bare rock.	A mixed forest of teak and its companions the Dhaura Khair, Sador, Khejra, Temru, Shisham and other species. The proportion of teak varies a good deal, but on the whole is fairly represented. The growing stock is very much mutilated, but young shoots of teak and other species are doing well. Bamboo is suffering from over-cutting. No shoots, but those of the current year, are found. There are many large grassy blanks. Same as the above.	Protection and improvement fellings are suggested, also planting up of blanks. Bamboo should be given rest.
6	Jalap forest.	North—rasta, Linkhi, and Semarwara, Pieth and the Bahadar river. South west—State boundary.	Elevation—600 to 770 ft. Slope—level to very steep and at places precipitous. Aspect—all aspects. Soil shallow to deep fertile; no humus. Slope—level to very steep. Aspect—all aspects. Soil—deep and rich to shallow, rocky and poor. No leaf mould.	It is a mixed forest of Teak, Khair, Dhaura, Khejra, Bor, Sangri, Temru, Sador and other species with next to no bamboos. The stock is much mutilated and there are strong new shoots as in the forests described above, as this is comparatively on a dry soil and has not had the advantage of protection in the same degree. There are large grassy blanks.	Protection with improvement fellings are proposed.
7	Richhan forest.	North and East—State boundary. South—The Mahi river. West—Lodawal, Gara and Dalpur villages.	Elevation—450 to 560 ft. Slope—gentle. Aspect—general eastern aspects. Soil—Fairly deep to shallow. No leaf mould.	A mixed forest of teak and its companions, much cut down at present and hence very open. But as it is situated on the bank of the Mahi it will prove a very valuable forest after a few years' protection.	Protection and improvement felling proposed.
8	Mahia forest.	North—The Mahia nala. South—Chikhli village lands. East—The Mahi river. West—Road from Galia-kot to Chikhli.	Elevation—450 to 651 ft. Slope—level to gentle. Aspect—all aspects. Soil—Generally poor, all good deep low ground being occupied by cultivation, but on the whole fairly good. No humus.	A mixed forest of Teak, Khejra, Temru, Hingot, Bor and other species, with large grassy blanks. Stock much mutilated, but new young shoots of teak are vigorous and promising.	Do.
9	Gurapla forest.	North—Paderi Chhoti and Surajpur villages. East—The Mahi river. South—Lador and Semlia village lands. West—Sagwara, Wardia and Warsingpur villages.	Elevation—760 to 974 ft. Slope—level to very steep. Aspects—all aspects. Soil from deep to shallow at places and bare rock at surface. No leaf mould.	Do.	Do.
9	Sagwara forest.	North—Padwa village. East—Semlia, Surajpur and Sagwara villages. South—Gawari village. West—Thakurda and Vadra villages.			

27	<i>Enginia jambolana</i>	...	Jaman	...	...	House building and agricultural implements
28	<i>Ficus bengalensis</i> ...	...	Bor	...	...	For shade and firewood. Lac insect may be reared on it.
29	" <i>religiosa</i> ...	...	Pipla	...	...	Ditto. Fruits pickled.
30	<i>Guruga pinnata</i> ...	...	Khapat	...	...	For beams. Fruits pickled.
31	<i>Gmelina arborescens</i> ...	...	Sewan	...	...	Furniture and house building.
32	<i>Grewia vestita</i> ...	...	Dhaman	...	...	Ditto and carrying poles.
33	<i>Holarrhena antedysenterica</i>	...	Dhudhi	...	...	Carving and furniture. Seed used in native medicine.
34	<i>Lagerstromia parviflora</i>	...	Kakria	...	...	House building and agricultural implements.
35	<i>Mangifera indica</i> ...	...	Anba	...	...	Door leaves and beams. Fruit eaten.
36	<i>Melia</i> ...	...	Limbra	...	...	House building and furniture.
37	<i>Minusops</i> ...	...	Khirmi Rain	...	...	Oil presses and turning.
38	<i>Odina wodier</i> ...	...	Gunjal	...	...	Beams and furniture.
39	<i>Ongenia dalbergioides</i>	...	Tanaj	...	...	Cart poles, agricultural implements.
40	<i>Phoenix sylvestris</i> ...	...	Khajur	...	...	Fruit for beams, juice for Gur and spirits.
41	<i>Phyllanthus emblica</i>	...	Ambla	...	...	Wood for agricultural implements, fruit for dyeing and eating, bark for tanning.
42	<i>Prosopis spicijera</i> ...	...	Sangri	...	...	Firewood also for well work.
43	<i>Procarpus marsupium</i>	...	Bia	...	...	House building and agricultural implements.
44	<i>Schbichera trijuga</i> ...	...	Kacham	...	...	Ditto ditto.
45	<i>Schrebera swietenoides</i>	...	Mokha	...	...	Ditto ditto.
46	<i>Soymida febrifuga</i> ...	...	Rohin	...	...	Ditto and Railway sleepers.
47	<i>Stephegyne parvifolia</i>	...	Kalam	...	...	Houso building and agricultural implements.
48	<i>Sterculia urons</i> ...	...	Karuli	...	...	Firewood and as a help for floating heavy woods.
49	<i>Tamarindus indica</i> ...	...	Imbli	...	...	Furniture, cart wheels, oil presses.
50	<i>Tectona grandis</i> ...	...	Sag	...	...	Houso building, furniture, railway sleepers, etc., etc.
51	<i>Terminalia Arjuna</i> ...	...	Arjan	...	...	Beams, karis, etc.
52	" <i>bellerica</i>	...	Balbera	...	...	Well work. Fruit for dyeing and medicine.
53	" <i>tomentosa</i>	...	Sador	...	...	House building, and railway sleepers, etc.
54	<i>Vitex negando</i> ...	...	Vana	...	...	Live hedges.
55	<i>Woodfordia floribunda</i>	...	?	...	...	Agricultural implements.
56	<i>Wrightia tinctoria</i> ...	...	Khirmi	...	...	Turning, bangles, etc.
57	<i>Zyzyphus Jujaba</i> ...	...	Bor	...	...	Agricultural implements
58	" <i>nummularia</i>	...	"	...	...	Bed posts and walking sticks
59	" <i>zylopara</i>	...	Kat bor	...	...	Firewood } Lac insect may be reared on these.